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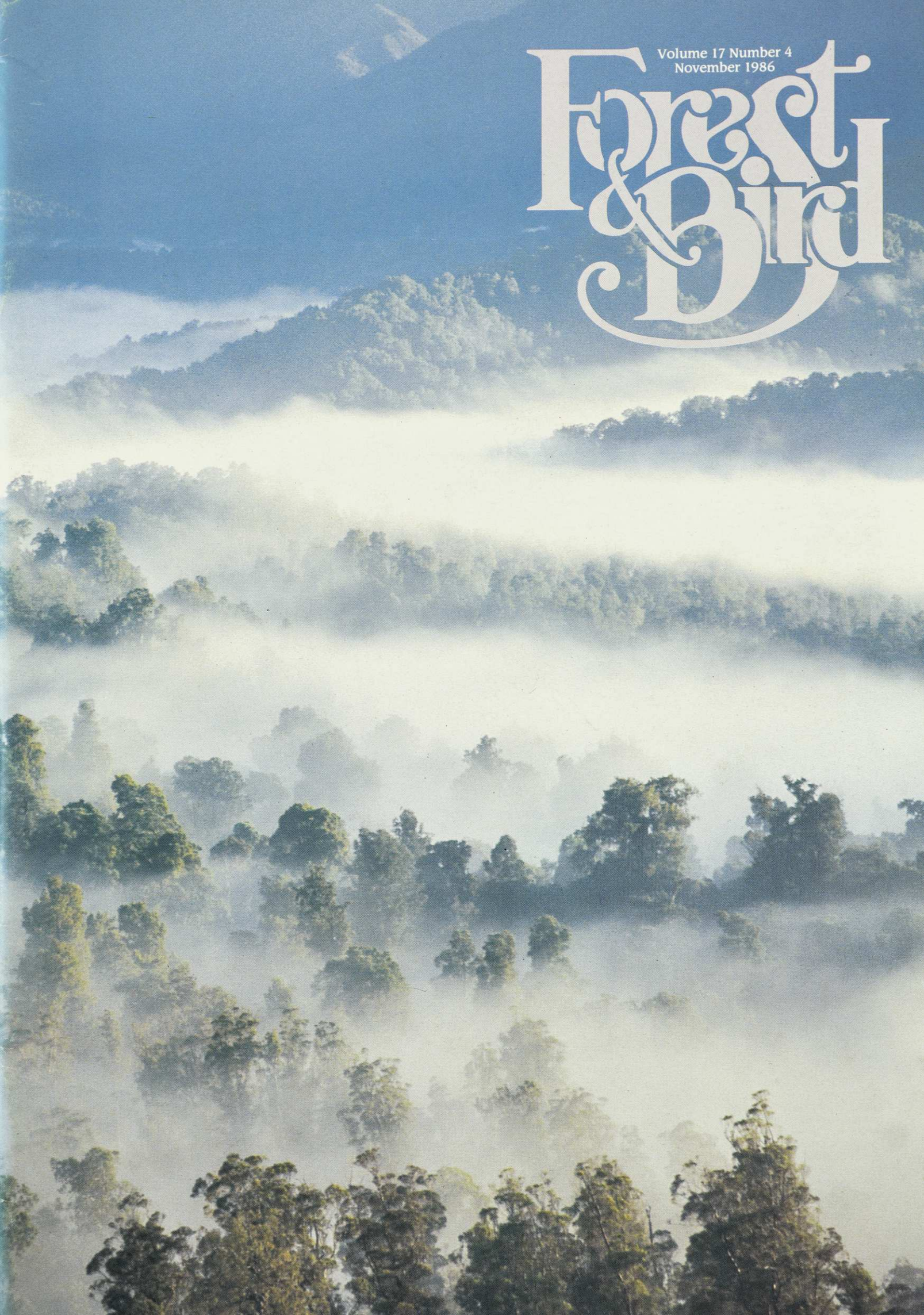
Forest & Bird



A mere 5 percent of mighty Molesworth at the head of the Wairau River in the north-west corner of the property, includes this high lake-studded basin with Bowscale Tarn (foreground) and Lake Sedgemere (middle distance). It is encircled by the snowy peaks of Turk Ridge and cut by the Awatere faultline. The Strategy Plan proposes to open up to the public this paradise of wetlands, wildlife and tussock landforms. Photo: Quentin Christie, DSIR Soil Bureau

Molesworth — Commerce before Conservation?

For many of our ancestors, the attraction of New Zealand lay in the fact that its mountains, forests, tussocklands and rivers were not the private estates of the aristocracy or a powerful commercial gentry. That tradition is changing, however, as the new Landcorp makes a bid for freehold title of some of our most important high country natural areas, and the spectre of unfettered commercialism rears its head as prefigured in its Act.

The 182,000-ha Molesworth Station is one such nationally important area; earlier this century private enterprise ravaged it and by the 1930s when acquired by the Crown it was eroded and riddled with rabbits. For 50 years it has been closed off to the public while its landscapes have healed through the wise use of taxpayers' monies. Its future now hangs in the balance. Last month, almost at the same time as the much-welcomed Molesworth Strategy Plan was released, Landcorp inappropriately announced that it looked forward to controlling the station — yet the Strategy Plan admits that few of its natural, recreational and cultural values have been identified although preliminary work shows these to be outstanding.

The Department of Conservation is seeking stewardship control of Molesworth; it has already been given responsibility for farm parks on Great Barrier Island and at Te Paki and Puponga — why not Molesworth as well? Certainly Molesworth is much larger, but the farm park concept is equally valid here.

The Government is poised to decide Molesworth's future. This will be done in secret and without any public involvement unless we protest. You can influence this decision. Write to the Prime Minister or your local MP. You are also invited to express your views on Molesworth's future mangement to Lands and Survey Department, PO Box 445, Blenheim, before November 30.

Front cover:
Veils of silver mist settle over the forest in the Oparara valley, near Karamea. Maori mythology describes how Papa, mother earth, sheds mists of grief for her lost husband Rangi, the sky, since their son Tane pushed them apart to create a forest world. The mist over the Oparara valley shrouds a magnificent lush forest, loud with bird song, which conservationists have been fighting to protect from logging operations. A government decision on the future of the valley is expected this month. Photo Guy Salmon

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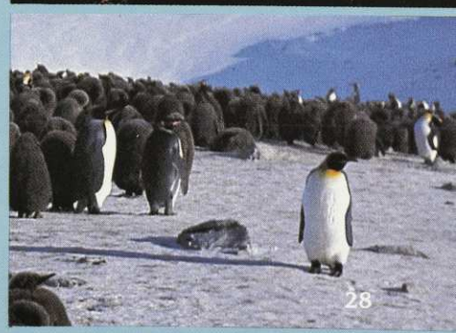

Lessons from the Past

The arguments for and against preserving indigenous species do not have to be traversed on this page, for most if not all readers of this magazine will be convinced of the aesthetic and scientific need for preservation of our unique plant and animal life.

Nor by now, after years of repetition, should there be any doubt that habitat protection is vital to the preservation of species. The Society recognised this early on in its history when it changed its name from the Native Bird Protection Society to the Forest and Bird Protection Society.

Unfortunately, out in the wider world there are people who do not understand, or more likely choose to ignore, the importance of habitat protection. Thus, decisions over who controls the habitats of our native plants and animals – so many of which are either endangered or vulnerable – are crucial. The "great carve up" is now underway, and it is to be hoped that the Department of Conservation will take responsibility for most of our natural lands.

One decision has already been made – over the administration of the vast South Island high country pastoral leasehold lands. It is too soon to gauge how effective the mechanisms that are now being developed to implement the joint responsibilities given to the Lands Corporation and the Conservation Department will be in protecting native plants and animals and guaranteeing access to the high country. Landcorp, which will administer pastoral leases and licenses, "must consult with and have regard to" the advice of the Department of Conservation over conservation issues on leasehold land. Will this be any different from the "consultation and regard" that has been given to the Wildlife Service's advice by other government agencies in the past? Only time will tell whether the complex formula for administering 2.6 million hectares of New Zealand will work in the best interests of the kea, black stilt, Armstrong's hebe, Otago giant skink and other unique high country inhabitants. High country farmers also have grave reservations about the sensitivity of a narrow commercial corporation to the traditions and difficulties of high country pastoralism.

Meanwhile, the Government has made the dramatic announcement that it wishes to solve "once and for all" the future of West Coast forests by November this year. If the pioneering ethic could be said to be alive anywhere in New Zealand, it would be strongest on the West Coast, despite the efforts of a growing number of conservationists there who see the best future for the West Coast in using its magnificent forests for tourism, particularly nature-based tourism, rather than destructive logging. An article this issue by our West Coast conservation officer, Kevin Smith, outlines the conservation case for setting aside sufficient habitat to preserve our precious indigenous species.

The rare and endangered birds singled out for attention in the magazine bring into sharp focus all the reasons why we would be poorer off without them. But, as Murray Williams' and Kevin Smith's articles show, our main efforts should be directed at making sure bird and plant populations do not plummet to the critical, endangered level. That should be a clear lesson learnt from the past.

Dr Alan Mark, President

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CRUNCH TIME FOR WEST COAST RAINFORESTS

The Government has declared that it wants to resolve the thorny issue of West Coast forests "once and for all" by the end of this year. The Joint Campaign on Native Forests, of which the Society is a member, is also keen that decisions on "nature's last great stronghold in New Zealand" are made as soon as possible — providing of course they are favourable for conservation. Here Society West Coast conservation officer, Kevin Smith, presents the case for why a network of reserves and wildlife corridors is vital for nature on the Coast.

In the beech forests of Tawhai State Forest on the West Coast, the pre-dawn darkness rings with the quavering whistle of the kaka. At daybreak, these large forest parrots often flock together above the forest canopy in small cacophanous family groups. Their musical whistling gives way to harsh, grating calls before they settle down and commence food-gathering for the day, tearing open the decaying limbs of ageing forest trees in search of beetle larvae rich in nutritious fats.

Lying in the heart of North Westland's beech forests, Tawhai is one of the best places in New Zealand to see this impressive bird. For kaka, despite their robust appearance, have very specialised habitat requirements. Few birds are seen outside the handful of large continuous tracts of unmodified lowland forest remaining in this country. Kaka are totally dependent on the large diameter podocarp and beech trees of the forest for food and nesting holes. These trees however, are also keenly sought by sawmillers.

Nowadays kaka are in high concentrations in only a limited part of North Westland, namely the low to mid altitude forests of the Reefton and Inangahua hill country. Sadly, the region's present reserve system cannot ensure the survival of kaka in one of its national strongholds. The bulk of the existing Big River Ecological Area in Tawhai forest lies above 600 metres, the normal upper altitudinal range of kaka. Lower down, the podocarp/beech forests of its preferred habitat are zoned for logging. They are currently sought for reservation by Wildlife scientists and conservationists. Because kaka range widely and only occur in relatively low numbers, large reserves of optimal habitat are essential to secure their survival. The future of kaka, other declining forest wildlife and irreplaceable forest ecosystems in North Westland and Buller will be determined shortly.

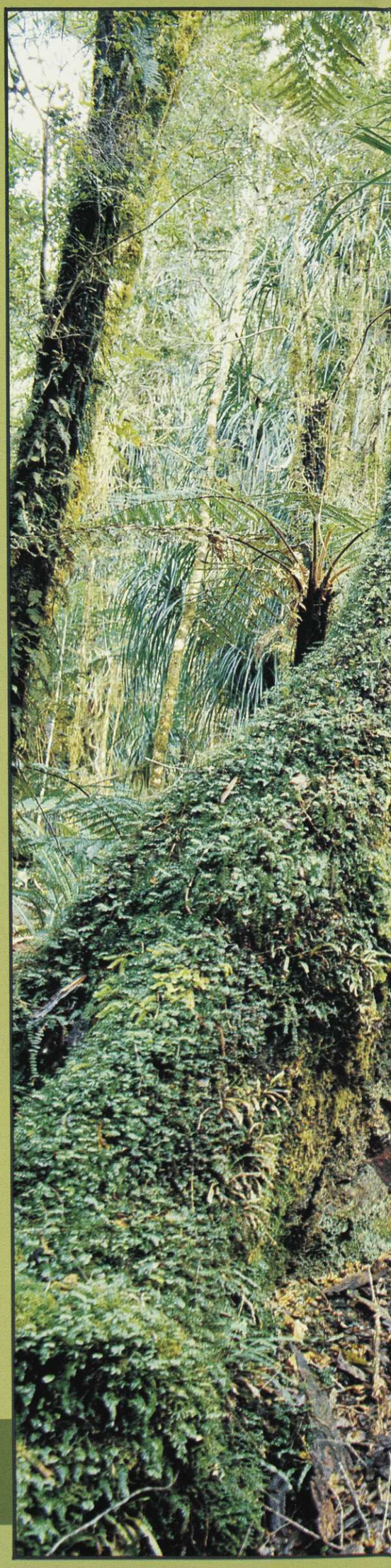
Legendary names

Government is about to take important decisions on the future of West Coast forests. Conservationists have been fighting to save these forests for a decade and more. Some of them have been household names for much of this time: Oparara, Paparoa and Maruia are legendary names that instantly evoke images of pristine landscapes, tall forests rich with bird song and unrivalled scenic splendour. Other forests have achieved national prominence only recently as logging roads bored into their hearts. These include Harata, Ahaura Gorge, Doctor Hill and the North Westland wildlife corridor forests.

Thousands of people have been involved in the conservation campaigns for these forests. Innumerable letters and submissions have been written, hundreds of field trips and public meetings held, and scores of politicians introduced to their beauty and ecological wonders. Despite this outpouring of concern, few of the key areas have been legally protected. Some of the finest natural landscapes and ecologically valuable forests remain at risk.

However, enormous shifts in public and official perceptions of these forests have

The inquisitive South Island robin strongly prefers beech forested valley floor habitats, which would be greatly affected by the planned extensive logging of the beech forests. *Photo: Terry Fitzgibbon*



The Mesozoic rainforests of ancient Gondwanaland survive in New Zealand's beech and podocarp rainforests. Tall-standing trees like this 300-year-old North Westland red beech tree are part of our natural heritage, hosting many birds, insects and perching plants. They deserve protection, not consignment to the woodchip pile. *Photo: Craig Potton*

Steep slopes, a raw wound. Forest Service chipwood logging has stripped away both forest and soil, leaving bedrock exposed. This logging was taking place in the North Westland wildlife corridor until very recently. *Photo: Kevin Smith*

occurred. There is now a national awareness that West Coast forests, once only looked on as a timber resource, possess diverse ecological, educational, recreational and natural heritage values. West Coasters, too, increasingly value these forests both in their own right and for the role they play in the regional economy through tourism.

Cossetted industry

During the last decade constraints on reservation have not applied to the West Coast timber industry. Cossetted by long term contracts signed in the 1960s, the industry has remorselessly devastated vast tracts of fine forest. Even today the opportunity to select representative reserves from the remaining forests is severely restricted by timber contracts that in most cases run on till 1990. An enormous 450,000 cubic metres of mainly rimu timber must be felled to honour them. Fortunately, the timber resource is large enough to enable the creation of a network of reserves covering the key conservation areas.

For the northern portion of the West Coast from Karamea through to the Hokitika region, proposed reserves have jointly been put forward to the Government by the Wildlife Service, the DSIR and Joint Campaign on Native Forests. In addition the National Parks and Reserves Authority has recommended a Paparoa National Park.

Decisions on West Coast forests have been repeatedly postponed by successive governments. Few politicians have comprehended their crucial national and international importance. As a people, we have been slow to recognise that New Zealand's indigenous forests are unique in the world. They are of international scientific, conservation and tourist interest because of the distinctiveness of their life forms, whose evolutionary lineage extends back 100 million years to the Mesozoic forests of Gondwanaland, and because of their world class scenery.

This picture sums up the typical inadequacy of the existing system of reserves in North Westland: the lowland forests in the foreground are zoned for production, while the Fletcher Creek ecological reserve is squashed up in the mountains behind. An extension of the reserve across part of the lowlands is now being proposed by conservationists. *Photo: Hugh Best*

Nature's stronghold

In this context, the West Coast holds pride of place as nature's last great stronghold in New Zealand. Here, tracts of magnificent natural landscapes still occur in very nearly primeval condition. These virgin lands offer our last opportunities to preserve a range of natural habitats and species that have long since been lost elsewhere. In Buller and North Westland these opportunities are rapidly diminishing as destructive logging progressively exhausts the once bountiful forest resource. It is the lowland forests, which are under the greatest pressure for timber production, that are vital for nature conservation. They possess the richest assemblages of plants, support the most abundant and diverse populations of native birds and offer habitats for many species of plants and animals that cannot survive in upland habitats.

Existing reserves in North Westland and Buller are grossly inadequate. They comprise a patchy scattering of mostly small scenic reserves and a series of State Forest ecological areas established in the mid 1970s. However, the political climate of that time was hostile to conservation. Only minimal reserve areas were put forward by the Forest Service and its scientific advisory committee. They largely ignored the recommendations of the DSIR and Wildlife Service, and the reserves were whittled away even further when an officials committee selectively removed podocarp dominant communities.

The inadequacies of the existing reserve network were highlighted by a recent report on future options for West Coast forests by the Secretary for the Environment. This report notes that the existing reserves have a strong bias towards upland and steepland areas. Lowland forest set aside are in the main non-merchantable or previously logged forest types (7 of the 12 North Westland reserves have had the bulk of the merchantable timber logged out of them). High volume podocarp forests and alluvial forests are poorly represented. From a wildlife viewpoint, the reserves are too small and dominated by high altitude and poor quality habitat.

Major new representative reserves have been promoted to rectify this imbalance. If approved, they will significantly increase the reserve representation of lowland forest communities. This, in turn, will enhance the ability of the reserve network to support viable wildlife populations, particularly of sensitive species such as kaka, parakeet and robin. They also have important amenity values and these form a crucial part of their justification.

The proposed North Westland wildlife corridor follows these forested hills across the grass-covered plains of the Grey and Inangahua valleys. The narrow forested link over the Reefton saddle (in the distance, left of centre) provides a vital connection for the movement of forest birds between the Paparoa Range forests and those of the Southern Alps. *Photo: Hugh Best*

Buller reserves

In the Buller, eight representative reserves have been proposed along with the Paparoa National Park and the Atbara-Nile park addition. The Buller forests have several nationally unique and distinctive features, the most outstanding being the forests of

the limestone syncline in the western Paparoas which form the largest intact tract of warm, lowland forest left in New Zealand. Exceptionally diverse vegetation is a feature of the region, reflecting the complex geology, varied landforms and different climatic regimes. The mild humid coastal climate allows warmth adapted North Island species to thrive eg, nikau, northern rata and rangiora. Over 40 species have their southern limits in the region including two major tree species, titoki and puketea. A remarkable number of endemic (ie, found nowhere else) species occur in the Buller, together with a number of other species whose distribution is centred on the region.

The presence and location of such species indicates the sites of vegetation refuges during past glacial episodes. The Buller region appears to have played an important role in sustaining the New Zealand vegetation during the ice age, and in contributing to its botanical diversity. The limestone syncline forests of the Paparoas are the most outstanding forest bird refuge in the South Island. Densities of forest birds are amongst the highest ever recorded in New Zealand. These include healthy breeding populations of endemic species with restricted distributions eg, western weka, great spotted kiwi, kaka, robin and parakeets. The remaining lowland forests of North Buller are also vitally important habitats for these bird species and as wintering over habitat for birds from the extensive adjacent uplands. Unique populations of large carnivorous land snails occur in some forests.

Key Reserve Features

BULLER

Paparoa National Park (30,000ha)

- largest intact tract of warm lowland forest left in New Zealand.
- exceptionally high diversity and abundance of native bird species.
- New Zealand's last large unspoilt lowland karst (limestone) landscape.
- outstanding scenery from coastal pancake rocks and blowholes to jagged mountain crests.

Atbara-Nile (Park Addition) 3,800ha

- excellent set of forested terraces not represented in other reserves.

Kohaihai (5,460ha)

- internationally important Honeycomb Hill caves containing excellent sub fossils of extinct birds.
- beech-free forests on the Oparara Plateau.
- good numbers of kaka, great spotted kiwi and landsnails.

Oparara (6000ha)

- nation's finest example of mixed podocarp beech forest on alluvial surfaces.
- dense wildlife communities.
- outstanding amenity values.

Little Wanganui (3100ha)

- best example of terraced valley forest in the Karamea District.

Ngakawau (9400ha)

- major terrace sequence of forest communities.
- high bird populations and two species of large land snails.

Karamea Bluffs (3300ha)

- representative example of coastal forest on visually prominent steeplands.

NORTH WESTLAND BEECH FORESTS

Deepdale (5100ha)

- major representative reserve in the Reefton Ecological District.
- beech-podocarp lowland forest on easy terrain.
- outstanding wildlife values with high numbers of kaka and parakeet, and one of densest robin populations in North Westland.

Winding Creek/Johnny Walker (1100ha).

- proposed addition to Coal Creek EA.
- best remaining example of kahikatea forest in region.
- lowland and hill country forest with very high kaka numbers.

Tawhai (6000ha)

- proposed addition to Big River EA.
- nation's finest example of hard beech forest, and transition to rimu forest.
- key area of kaka habitat in North Westland.

Mt Harata (1600ha)

- best remaining example of tall red beech terrace forest in Grey Valley.
- known habitat of rare yellowhead and good numbers of more common forest birds.
- adjoins middle gorges of Grey River, a nationally important wild and scenic river.

Ahaura Gorge (1100ha)

- outstanding sequence of forested river terraces unrivalled in North Westland and probably of international significance for the monitoring of soil and vegetation development over time.
- forest surround of Ahaura River Gorge, a wild and scenic river of national importance.
- very high parakeet numbers.

Otututu (1500ha)

- river terrace and floodplain forest communities poorly represented in existing reserves.

Moonlight (210ha)

- best example of lowland terrace forest in Blackball Ecological District.

Maruia West Bank

- best developed red beech stand in South Island on regionally unique glacial landforms
- valley floor forest with excellent populations of robin and parakeet.
- outstanding scenic values.

CENTRAL WESTLAND PODOCARP FORESTS

Card Creek (1600ha)

- virgin forest on prominent limestone ridge.
- addition to adjoining Card Creek EA essential to ensure viability of its wildlife populations.

Kaniere (500ha)

- only remaining example of dense rimu hill forest in Hokitika Ecological District.

Doctor Hill (1250ha)

- best remaining example of warm mixed podocarp foot slope forest providing optimal forest bird habitat in Hokitika district.
- rare lowland population of blue duck.
- scenic forest at mouth of Doctor Creek valley, a popular tramping route.

Upper Totara (2440ha)

- nationally important area of pink pine forest.
- best example of lowland kaikawaka forest in Hokitika District.
- isolated population of robin and type locality of land snail.

Kakapotaki (450ha)

- striking coastal ridge with high amenity values.
- representative examples of coastal and swamp vegetation, podocarp forest, silver pine associations.
- forest and swamp bird populations including robin and bittern.

North Westland Reserves

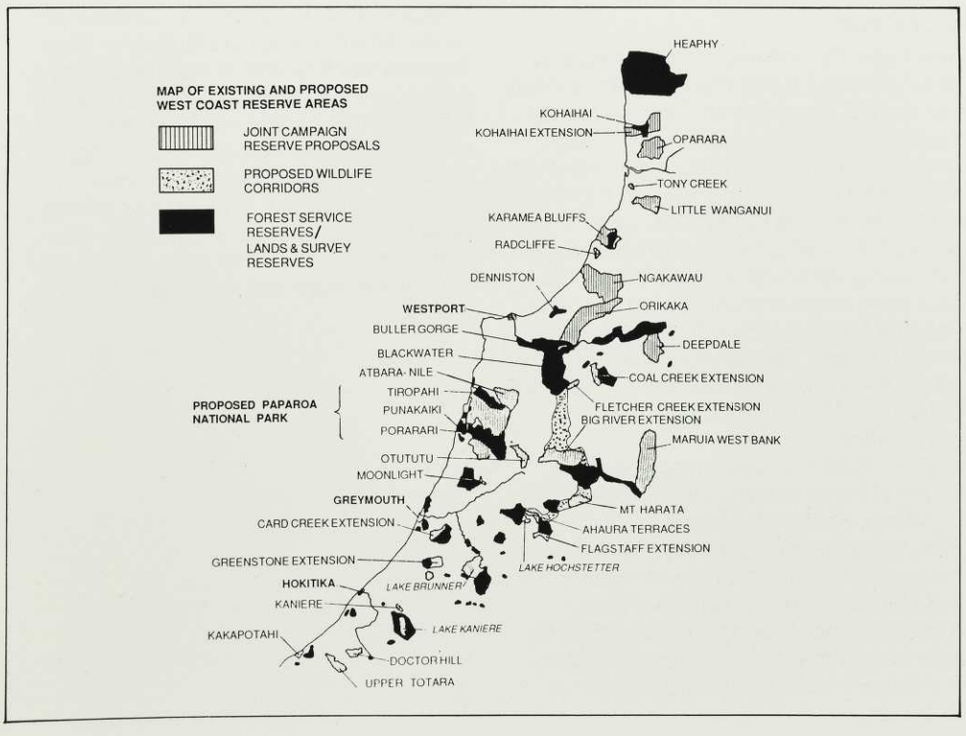
Long the centre of environmental controversy, the lowland beech forests of North Westland are very poorly served by the existing reserves. Yet this is a region of extraordinary ecological interest and tremendous scenic appeal. Beech forests are better developed here than elsewhere in the country. All four beech species — red, silver, mountain and hard — are well represented across a wide spectrum of landform and altitudes in both pure stands and in mixed beech-podocarp forests. They include the nation's finest examples of red beech forest (Maruia) and hard beech forest (Tawhai).

The impact of glaciation on the landforms and biota can be traced back over tens of thousands of years. By contrast, in South Westland evidence of earlier glaciations has been eliminated by recent heavy glaciation. This makes North Westland a crucial area for understanding the development of soils and vegetation over long periods of time.

Moreover, in North Westland, the two major forest classes, beech and podocarp, meet in one of the foremost anomalies in the distribution of New Zealand forest vegetation. The beeches, with their poorly dispersed seeds, seem to be slowly expanding their range southward into the podocarp forest of central Westland from old ice free refuges to the north.

North Westland forests have exceptional wildlife values. They are an important national stronghold for three declining species with limited distribution, namely kaka, parakeet and robin, and contain small populations of the rare yellowhead. For these and many other wildlife species the importance of such a large, diverse and relatively unmodified area of forest cannot be overestimated.

Ten major reserves are sought in North Westland, the largest being the Maruia West Bank, Deepdale and Tawhai (Big River Ecological Area extension) proposals. The reserves, like those of the Buller and Central Westland, have been chosen to protect viable representative examples of the vegetation, wildlife, landforms, geology and soils of the region's ecological districts. Each ecological district (there are five in the North Westland beech area) is a separate biogeographic division and provides a basis for assessing the natural diversity of plant and animal communities.



If accepted by the Government, the proposed Tawhai extension to the Big River ecological reserve will be New Zealand's prime reserve of hard beech. It will also be an important stronghold for the declining kaka, which still thrives in this extensive low hill country. *Photo: Mark Bellingham*

The future of the Ahaura Gorge's superb rimu forest — and other Central Westland podocarp forests — is still uncertain. Earlier this year public protest resulted in logging gangs being pulled out of this proposed reserve which also forms part of the wildlife corridor. *Photo: Hugh Best, Wildlife Service.*

Central Westland Podocarp Forests

Centred on Hokitika, this region has borne the brunt of 120 years of exploitation on the West Coast. The former dense podocarp forests of the river plains and lower terrace flights have been almost entirely cleared. Only a limited number of the originally wide range of forest types are well represented in the sizeable Lake Kaniere Scenic Reserve. Most of the podocarp hard wood forest on the hills and higher terraces has been extensively logged. Wildlife populations are impoverished compared to the other regions with robin, kaka and parakeet all scarce. The State Forest reserve system is almost non-existent. The 42,300 ha of State Forest in the Hokitika Ecological District, more than half of which is in production forestry, contains no ecological areas.

Four representative reserves have been proposed for the best remnant forest stands in the area and to ensure the wildlife populations are not further depleted.

North Westland Wildlife Corridor

To ensure the survival of healthy wildlife populations in North Westland, the Wildlife Service has recommended linking the key reserve areas with continuous protected forest corridors. The corridor extends from the upland forests of the eastern Paparoas across the Reefton Saddle hill country through to Tawhai Forest and upland forests along the Southern Alps. This is the only remaining forested link between the Paparoa Range and Southern Alps. From Tawhai Forest, the corridor extends southwards linking key lowland wildlife habitats of Harata, Flagstaff, Ahaura Gorge and Hochstetter.

The corridor proposal recognises the reality of forest management in North Westland. Strong competing proposals from the timber industry exist for the use of the region's lowland forests for sawlogs and chipwood. This means that the reserves and their linking corridors must be able to sustain viable wildlife populations of the more sensitive species largely on their own.

Research has shown that native bird densities are sharply reduced in managed beech forests with their patchwork of slowly regenerating clearfelled areas. Kaka, parakeet and robin populations reduce to zero after logging; only introduced birds increase in abundance. In sum, the wildlife corridor is needed for several key reasons: to maintain species diversity by allowing wildlife populations to mix between reserved areas; to permit seasonal movements of birds and other fauna to lower altitudes; and to provide additional habitat for species like kaka and parakeet that need large areas of relatively unmodified habitat. The corridor also provides a reservoir of species to recolonise any adjoining modified forest areas.

The Wildlife Service believes that, in the absence of wildlife corridors, a series of forest reserves separated by modified poor quality habitat will not guarantee the survival of all North Westland's indigenous forest fauna.

Reinstatement of Original Reserves

Conservationists are also seeking the reinstatement of original reserve areas deleted by the 1979 Officials Committee. The largest area is an 1800 ha tract of regenerating rimu forest excised from the Greenstone Ecological Area on the Greenstone Plain west of Lake Brunner. Also included is the last unlogged silver pine stand in North Westland which should be added to the Flagstaff Ecological Area.

Forest Service amenity reserves, which seek to preserve North Westland's scenic backdrop, should also be given legal protection.

Important choices face the Government on the future of West Coast forests. Their decision will be a test of our maturity as a people as it will irrevocably determine the fate of a large portion of this country's forest heritage. Opportunities exist to establish an unrivalled network of forest reserves that will be treasured for generations to come. Instead of symbolising despair and a lost past, the kaka can become a symbol of hope and confidence in the future.

NATIVE BIRD MANAGEMENT

The following is a personal view of the future management of our vulnerable and endangered native birds by Wildlife Service scientist Dr Murray Williams. The article raises more questions than it answers, giving readers pause to think who have always accepted that prevailing management practices are correct.

The black stilt, the world's rarest wading bird, is being genetically swamped by the more aggressive pied stilt in what is a natural process. The author asks whether there is any point in fighting against such a process, and whether a species like the grey duck, which is being genetically swamped by the mallard, should also be protected in the same way. *Photo: Ray Pierce*

As greater New Zealand emerged from the last ice age, about 15,000 years ago, it did so in concert with a rising sea level. Greater New Zealand, with its now three main islands then as one, shrank, its extensive lowlands were drowned and its old coastline disappeared eventually under some 180–200m of water.

Just as the land connections between North, South and Stewart Islands were sundered, so were those between the hinterland and the near coast hills. These hills became islands, now termed landbridge islands — Kapiti, D'Urville, Great Barrier and Hauraki Gulf islands may be viewed as remnants of that Greater New Zealand.

These islands carried with them, at separation, all the floral and faunal heritage of the mainland. But viewed some 10–15 millennia later, each island now has its own special character, its own, and in many cases unique flora, and an assemblage of native birds that may also be different from that of its near neighbours.

Obvious pattern

When the native forest-inhabiting bird faunas of New Zealand's many landbridge islands are compared (see Box 1), an obvious pattern emerges. The large islands contain more native species than do the small islands, and the particular assemblage of native bird species on any island is directly related to the island's size. Simply, this is because large islands contain larger tracts of forest and a greater diversity of habitats within those forests. Thus, a greater number of species can live there side by side and each can exist in abundance. On the other hand, small islands have few different habitat types and their bird populations are smaller; small islands characteristically contain only birds like fantail, silvereye and grey warbler, species which have small territories, are good at moving from one isolated habitat to another, and are capable of exploiting a wide variety of habitats.

These relationships between an island's size and the number and identity of bird species living there are but some of the findings of a branch of ecology called island biogeography. Throughout the world, the faunas of many groups of islands are being subjected to analyses by students of this discipline seeking to identify new relationships. This pursuit is not a flight of scientific fancy but has special relevance to the conservation of bird and other animal species in mainland reserves. Isolated patches of forest on the mainland, surrounded by a sea of grass farmland, are essentially islands, with some species of forest-inhabiting birds no more able to cross the sea of grass than they are to cross the water to landbridge islands. Thus, it is agreed, a study of landbridge island faunas, and the processes that affect them, can provide guidance for the conservation of species restricted to mainland forest "islands."

Perhaps the simplest and most obvious extrapolation from these island studies is that if a species has failed to survive the 10–15 millennia of isolation on a landbridge island of a particular size, then it is equally unlikely to survive *long term* in a similar sized isolated forest block on the mainland. The corollary to this, of course, is that if a species — stitchbird, for example — failed to survive on Mercury Island (22 km²), but did so on Little Barrier Island (30 km²), then any mainland reserve for it has to be in the order of 30 km² to ensure its long term survival.

Ignores vital point

This simplistic extrapolation, while correct in general terms, ignores at least one vital point: that the modification of each island's avifauna after it separated from the mainland, took place under pressures which did not include a suite of mammalian predators or herbivores, nor other human-induced changes. The kokako, for example, failed to survive on Little Barrier Island, disappearing from there without being faced by deer, goats and possums, now known to compete with it for food in Pureora Forest, and without the attention of cats, mustelids and rats which have plundered their nests in Pureora. The number of kokako able to live on Little Barrier Island was simply too few to allow the bird to sur-

vive the natural vicissitudes of these 10–15 millennia.

Today the combined effects of humans and their introduced animals maintain bird populations in mainland forests at lower densities than occurs on landbridge islands. And mainland forest patches also tend to contain fewer native bird species than islands of similar size. The conclusion is that for long term survival on the mainland, a species like the kokako is going to need an area of forest **bigger** than island biogeographic studies predict. **For North Island kokako, there are no such areas left.**

The purpose of this short venture into the world of island biogeography is to illustrate that even in the absence of detailed biological studies on our forest-inhabiting birds, there are explanations as to why some species and not others are presently in the endangered category, and what sort of reserve size is needed to sustain them, long term, on the mainland. Island biogeography gives us some very clear messages.

- it is the highly endemic species, the truly unique New Zealanders, that are the ones most affected by forest fragmentation
- it is the highly endemic species that need to exist in minimum numbers over very large areas in order to survive long term. Island biogeographic studies help identify the minimum area required, and hence the minimum numbers.
- as forest fragmentation continues, those species now in the threatened category will also become endangered – yellowhead and whitehead, kaka, rifleman and robin, brown and great spotted kiwi are just some of the likely candidates.

It is the inevitability that more uniquely New Zealand birds will fall into the endangered category, and the realisation that present conservation resources (manpower and finance) are so stretched as to be unable to cope with the endangered species we already have, that calls for some radical and clear thinking. With the advent of a Department of Conservation and the expectation that accompanies it, perhaps this is an appropriate time to review conservation objectives, priorities and operations. What follows are but some of the topics which I believe are germane to that review.

An analysis of New Zealand forest bird species on landbridge islands was conducted by Rod East and the late Gordon Williams and published in the *New Zealand Journal of Ecology* (1984). Their principal findings are listed below.

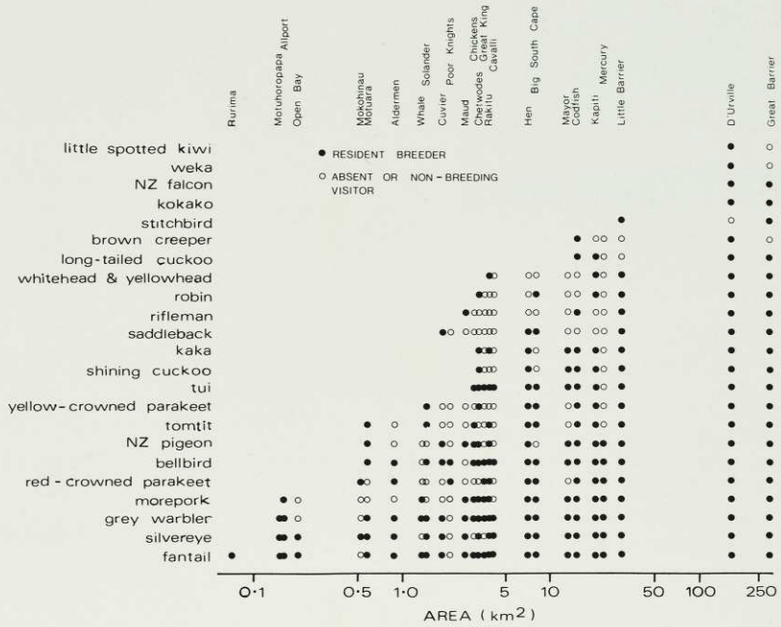


Figure 1: Occurrence of indigenous forest-dwelling birds on offshore islands of different size. For each species, symbols indicating absence are shown only for those islands larger than the smallest occupied as a resident breeder.

Conclusions

- As island size declines, species loss occurs sequentially in a predictable manner
- Apart from the falcon, species restricted to one or both of the largest islands or the mainland (eg brown kiwi) are partially or completely flightless and are endemic
- Species absent from islands of 15-30 km² are dependent on indigenous forests and belong to endemic families
- Other species dependent on indigenous forests occur less frequently as island size declines below 10 km², and are absent from islands of less than 1 km²
- Birds occurring on small islands are not dependent on indigenous forest

There is a disproportionate loss of species showing a high level of endemism and dependence on indigenous forest as the size of the island declines from above 100 km² to below 1 km².

Endangered vs threatened – where to concentrate the effort

Conservation efforts are directed almost exclusively at the highly endangered species – kakapo and takahe, black robin and black stilt, kokako and little spotted kiwi. But the monocular concern with these species is allowing others to enter the self-same category. Some can do so literally overnight, as little spotted kiwi did when the expectation that they occurred in Westland proved incorrect. The present distribution of North Island brown kiwi, great spotted kiwi, yellowhead, rock wren, weka, brown teal and blue duck (in the North Island) provide evidence for justifiable concern. Should we wait until they too become truly endangered before taking direct action? If the answer to that question is "no", does it mean that work on some already endangered species should stop? It would be a courageous decision indeed to abandon a species, but it is one that ought not to be shirked if considered necessary. The belief that the battle to save the kakapo and the black robin is already lost and should be abandoned in favour of species offering better chances of success is not without its supporters.

Islands or mainland

Factors which caused the decline or extinction of species on the mainland may stilll be present and it was logical to prevent total extinctions by establishing remnant populations on largely unmodified islands. But should our conservation horizons not now be extended? Should not our long term aim be to re-establish those species (like stitchbird, saddleback and little spotted kiwi) back on the mainland? What would this involve? When should this be attempted – now, next century or never?

Island biogeographic studies suggest another reason why the mainland ought now to receive greater emphasis. The number of species resident on an island is limited by the island's size. One simply cannot go on adding species after species to an island and expect them all to survive, even in the short-term.

Species or Sub-species

The islands of New Zealand have spawned a number of quite unique island races of mainland species (e.g. fernbirds, snipe, tit, robin, wren). Where do

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Forest Size and the Future of the kokako

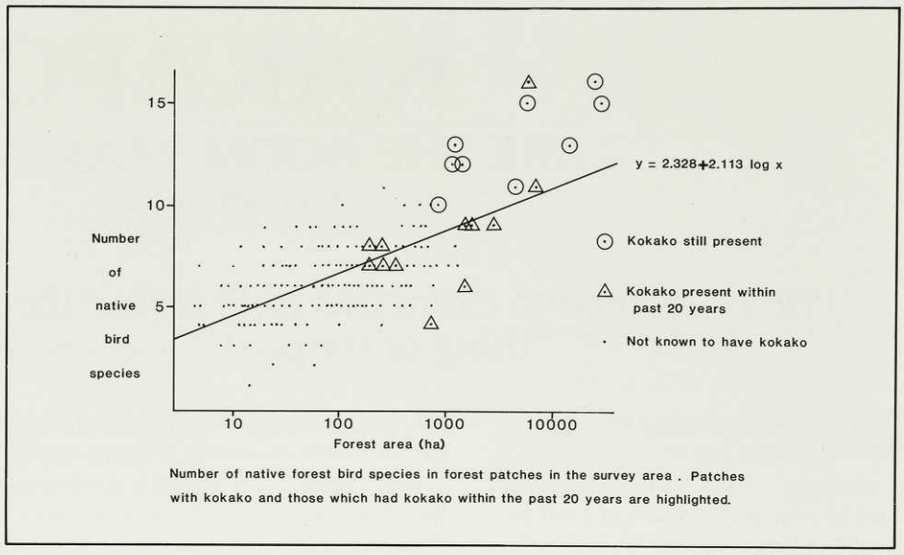
A direct relationship between the size of a forest patch on the mainland, and the number of native forest birds present, exists in similar form to that for landbridge islands.

This graph (compiled from data collected by a Wildlife Service survey in the King Country, and analysed by Colin Ogle) highlights forests in which kokako are still present and from which they disappeared in the last 20 years.

The birds have gone from six of seven patches of 200-1000 ha which contained them 20 years ago, and from six of the eleven patches between 1000 and 10,000 ha in area. The process of loss is clearly continuing and is remarkable for its speed – some of these forest 'patches' have been so for less than 100 years, a mere tick of history's natural clock!

The line on the graph denotes the 'average' relationship and indicates the number of species which, on average, will occur in a forest patch of a particular size. All forests now containing kokako lie above the line and thus can be expected to lose one or more species. Island biogeographic studies suggest that it is the most highly endemic species, with their low breeding rate and demand for large space, that will go before others – a precise description of kokako!

Kokako failed to remain on Little Barrier Island (30,000 ha) and on smaller islands; the two largest forests in this set are Pureora (24,000 ha) and Whareorino (30,000 ha). What will this graph look like in another 20 years?



Number of native forest bird species in forest patches in the survey area . Patches with kokako and those which had kokako within the past 20 years are highlighted.

they lie in the continuum of conservation interest? A commitment, indeed a very large one, has been made to black robin on the Chathams; if a similar problem occurs elsewhere should the same response be made?

These island sub-species pose a special problem. Their transfer beyond their existing islands is likely to be especially controversial, even though such an action would reduce their vulnerability. The avifauna of The Snares is a case in point; sooner or later (and most likely sooner) rats will make it ashore and the delightful tits and fernbirds would fall easy prey.

Fighting with or against nature

Any appraisal of conservation priorities and activities should consider the natural events taking place. I make this point because efforts to save black stilt make me uneasy. The black stilt dilemma is that it is being genetically swamped by a recent colonist of New Zealand – the pied stilt. Why are we fighting against a 'natural process', one that has occurred here, and all over the world, many times? Is this not one of the ways by which new species evolve? If we continue the fight for the black stilt, should we not also consider doing it for grey duck before it too is genetically swamped by mallard?

Self-sustaining or managed populations

In the scramble to at least get some populations of endangered species established on islands, birds have been released there and left to their own devices. Thankfully in almost every instance it has worked. This approach may be fine for the best of our landbridge islands, but is unlikely to be successful on other islands and the mainland. A more active managerial role will be required.

Kokako epitomise the need for constant management. There are no forests left in the North Island in which kokako are likely to survive long-term, and without human help. Yet in even small areas like Mapara Forest (1300 ha) a constant campaign of predator control and control of browsing mammals, and the planting of food plants for the birds could be enough to ensure their presence well into the next century.

Has the time come for the appointment of professional gamekeepers in New Zealand, who would live on site and be responsible for watching over our endangered native wildlife? At present the role is filled by a handful of dedicated Wildlife Service staff and individuals like Hori Sinclair (pictured), who keeps an eagle eye on the Waipori Wetlands in Otago. *Photo: QEII National Trust*

Conservation of endangered species on the mainland is almost certainly going to require constant management; the 'gamekeeper' approach to wildlife conservation is surely an idea whose time has arrived in New Zealand.

Single species v communities

The emphasis is on *single species!* Those concerned with the conservation of New Zealand's wildlife have yet to embrace the philosophy so widely espoused by botanists, that of seeking the reservation of whole communities. Yet our forests were once home to unique assemblages of birds. Would it not be worth the effort to seek to conserve the best assemblages still remaining? Perhaps the best example I can offer is that of the avian community in wetland margins. Today, bittern, fernbird, marsh crake, spotless crake, pukeko and banded rail still occur in scattered locations – but where are they still all together?

There are, of course, numerous other topics which should be included in any review of the sort I am advocating. The question of resources is clearly central to the whole debate. What we should not overlook is that wildlife is an intensely saleable commodity, both in New Zealand and worldwide. The wider community, including the business community has yet to be exposed to a marketing approach akin to that for the Americas Cup challenge – why not? The practical work in species conservation is still mainly handled by a small dedicated group within the Wildlife Service – but there is clearly a need for a wider community involvement. If the 'gamekeeper' approach is adopted, who better than the Royal Forest & Bird Protection Society to promote the debate to redefine our conservation objectives and priorities?

KAKAPO

ARE THE BOOM YEARS OVER?

by Gerard Hutching

"He is doomed to extinction long before the kiwi and the roa are a thing of the past." (Charlie Douglas, 1899)

"Just think what it would have been like 100 years ago with all those males booming." Apart from the hoarse cry of a kiwi and the shrill whistle of a weka, silence greeted Wildlife Officer Dick Anderson's words as the gloom gathered over the vast Transit Valley — proof that 1986 was not a good year for kakapo breeding in Fiordland.

Anderson, Park assistant Chris Hughes and I settled in for the evening on a rock almost 1000m above sea level. It was 10 pm; to the west we could just make out the silvery sparkle of the Tasman Sea, while some kilometres away at the head of this inaccessible valley a great waterfall spewed out of a cleft in the rocks below Lake Morton.

Immediately to the left loomed the rock outcrop popularly known as "The Kastle" by those who had come since the mid-1970s to the Transit Valley in search of kakapo, and behind us higher up lay Lake Liz, where we had out base.

This, then, was kakapo country, 1986. A straggling remnant of a once numerous species now occupied this outpost — the only mainland area with perhaps the exception of North-West Nelson where it is still known, although at one time much of New Zealand had belonged to this timid, flightless bird, before humans had crossed its evolutionary path.

It is estimated that perhaps only six of the world's largest parrot remain in Fiordland, all of them probably male. So far none have been sighted in North-West Nelson, but indications are whatever population may live there will be male and ageing.

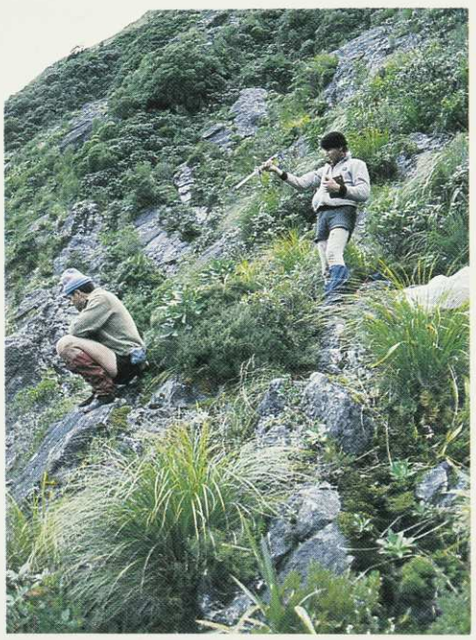
Only on Stewart and Little Barrier Islands are the kakapo in any numbers — fewer than 50 on Stewart but their 6000-hectare area is threatened by prowling wild cats, and 21 on Little Barrier, none of whom are breeding.

"This is one bird that's in a hell of a lot of trouble," Anderson muttered as, the evening watch over, we made our way back up the 100 metres to base camp.

The beginning of the kakapo's decline is traced back to the arrival of Maoris in Aoteoroa and the introduction of the Polynesian dog, kuri, and the rat, kiore (*Rattus exulans*), although Gordon Williams considered its numbers and range had shrunk before humans affected it. Explorer Charlie Douglas observes that "dogs are very fond of kakapo hunting, not alone for the fun, but because they are good eating."

When Maoris first landed, kakapo would have been everywhere throughout the three main islands, and may have even lived on the Chatham Islands. Dr Phil Millener's studies of cave deposits in the King Country have shown that at one stage the kakapo was a common bird in that region.

The kakapo would have been easy game. The ever quotable Douglas provided this colourful description: "The birds could be heard, coming along snarling and squealing as is their wont. When the Maorie (sic) knew that a bird was close, he suddenly flashed a light with a torch, the bird stopped and glared with amazement and so was easily caught. At other times they could be caught in the moonlight, when on the low scrub, by simply shaking the tree or bush till they tumbled on the ground, something like shaking down apples. I have seen as many as half a dozen kakapos shaken off one tutu bush this way." (*Birds of South Westland* 1899).



Radio-telemetry is used extensively in the battle to save the kakapo, an essential tool for the dense forest and alpine shrubland work carried out by the Wildlife Service. *Photo: Gerard Hutching*

By the time Europeans came to New Zealand, the bird's range had contracted considerably, although it lived in parts of the central North Island and was abundant in the Nelson district, on the West Coast and in Fiordland. As late as 1879 it was still found in the Marlborough Sounds. The introduction of the stoat and ship rat spelled disaster for such vulnerable birds as the kakapo, which, having no knowledge of such predators, also had no defences against them.

During the 1950s to the 1970s, the search for survivors of these catastrophic changes narrowed down to the Milford catchment in Fiordland. However, the exciting discovery of about 200 on Stewart Island in 1977 gave kakapo watchers fresh hope; their optimism suffered a setback, though, as cats have whittled down this number and caused the Wildlife Service to shift some of the population to Little Barrier Island for the species' safety.

Early spring, 1985, the signs had been encouraging, pointing to the possibility of a "booming" year — a reference to the curious breeding behaviour of the kakapo. The male fashions out a bowl high up on a ridge, usually with some natural reflecting surface such as a rock behind. The naturalist Richard Henry describes how the male then develops an air sac which can be puffed out like a balloon or drum. "They start with a couple of short grunts, and they utter five or six deep measured notes like the sound of a muffled drum, the loudest in the middle." Recent field research has shown that the female is then attracted through this booming to the mating arena — the kakapo is the only New Zealand bird, as well as the only parrot and flightless bird in the world to exhibit such "lek" behaviour.

Booming years to kakapo watchers are like the rut to the deer-stalker — the time when the animal makes itself most obvious. Because kakapo are essentially shy, secretive birds (and nocturnal, as the "Collector" Andreas Reischek lyrically observed: "they leave their burrows after

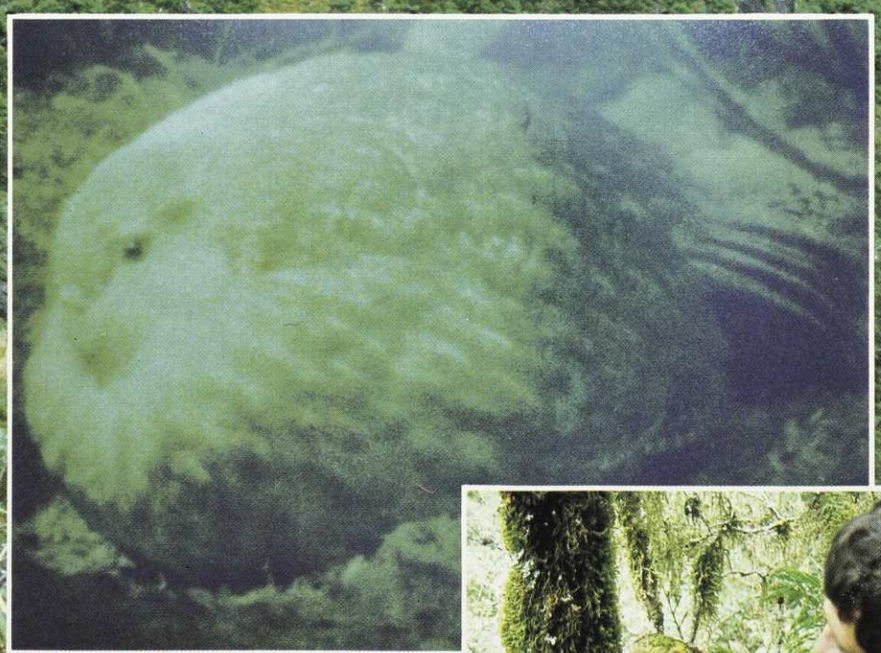
Opposite: **The "Kastle", on top of which male kakapo have been observed booming to the valley below. Unfortunately, no females have recently answered the call, which can be heard some kilometres away.** *Photo: Gerard Hutching*

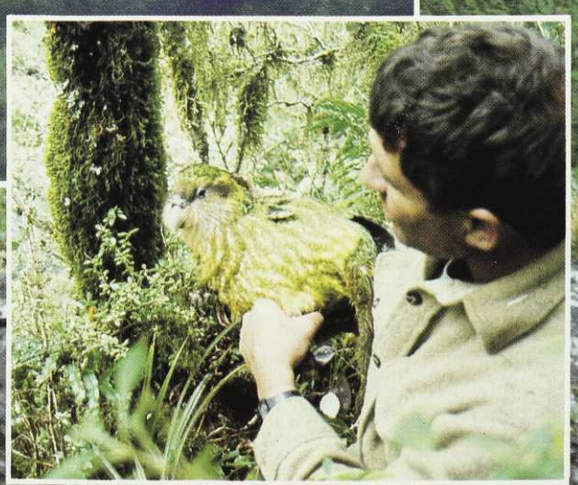
Inset top: **Light-intensifying 'scopes have allowed scientists to observe kakapo by night, and see for the first time the curious phenomenon of "booming" — the means by which the male attracts a mate.** *Photo: Rod Morris*

Inset bottom: **One of the few remaining kakapo known to exist in Fiordland held by Principal Wildlife Officer Dick Anderson. The bird's moss-green colouring provides some defence against predators, but its strong scent and "freeze" posture has made it easy game.** *Photo: Gerard Hutching*

"Extinction of this remarkable animal must be averted."

(Don Merton, "The Kakapo: A Recovery Plan," 1982)





New accommodation (right) is a vast improvement on the traditional, more cramped A-frame. *Photo: R Anderson*

sunset and the moon is their sun,''), and because they boom only every two years, it is vital that these times be observed.

An expedition of about a dozen Wildlife Officers and volunteers assembled at Te Anau in mid-January 1986, and with the aid of helicopters were removed from the comfort of motel beds to perches thousands of feet high on mountain fastnesses within minutes. Some were more fortunate than others; their homes for the next few weeks would be huts supplied by BP as part of the company's $23,000 contribution to the kakapo project. The remainder would have to settle for tents, come rain or snow.

The first morning of my stay in the Transit Valley, we decide to tackle ''The Kastle'', so named for its impregnable appearance. From our camp, the safest way up to it is via a fixed rope suspended down a steep gut. Access to this natural promontory is extremely hazardous for humans, but kakapo have clambered up such steep ridges for eons towards their rendezvous with their mates. Perhaps only here have predators failed to penetrate.

Signs are apparent of kakapo feeding but disappointingly they are old, possibly several months or even longer. Tales of kakapo feeding and ''housekeeping'' habits are legend.

''They are quite fussy about their booming areas which they like to keep clean and tidy. If twigs are placed at right angles on their tracks they take pains to place them aside — its a good way to work out if they have been in the vicinity recently,'' explains Anderson.

Strictly vegetarian, their favoured foods are spaniard, celmisia, dracophylum and tussock, of which they eat large amounts to gain a weight of up to 3.4 kg.

''In July they are in splendid condition, those found having as much as two inches of fat on them. They used frequently to plunder the vegetable garden I had established near my lonely camp, and one morning I actually came across one asleep under a cabbage. He had so gorged himself during the night that he could go no further.'' (Reischek, *Yesterdays in Maoriland.*)

The following three days are spent in exhaustive and exhausting searches for kakapo sign. Distances are measured in hours rather than mileage, for leatherwood makes for uncompromising travel. By the end of the week we have seen a little sign but a fraction of the valley, and one understands why helicopters have become such an important part of Wildlife work.

At night the news of the day is broadcast to Burwood Station at Te Anau, which receives from all the kakapo searchers in Fiordland as well as those on Stewart Island, staff working on takahe in the Murchison Mountains and on black stilt in the

Richard Henry, early conservationist

The person most often associated with kakapo is that remarkable early conservationist, Richard Henry, whose biography* Richard Henry of Resolution Island *is to be published in the near future (authors Susanne and John Hill, Publisher John McIndoe). With the kind permission of the publishers and author,* Forest and Bird *here reprints an edited version of the book's Epilogue, written by Don Merton of the Wildlife Service.

There can be no doubt that Richard Henry was a remarkable and talented field naturalist, although perhaps only recently has the real significance of his work become apparent.

New Zealand's present success and international leadership in the management of threatened species might not have been achieved without Henry's foresight and commitment in conceiving and carrying out his innovatory work. It was a pioneering effort and established a solid foundation for what has later become a most successful means employed by the New Zealand Wildlife Service and others of rehabilitating critically endangered species. The technique, which has been developed and refined over the years, has been the mainstay of our endangered species management, especially for the higher endemics many of which are incapable of co-existence with predatory mammals. Because effective long-term control of predators is not feasible on the mainland of New Zealand, predator-free islands offer such species their only hope of survival in the wild. Since Henry's time, at least sixty transfers of birds to islands have been made for conservation purposes, involving sixteen bird taxa. Over two-thirds of these transfers have been successful. The technique has also been employed in the conservation of indigenous reptiles and invertebrates. Without these measures, at least a further four New Zealand bird taxa would now be extinct.

Hard work

Henry's record of capturing and transferring birds in Dusky Sound is quite remarkable, given that kakapo are solitary creatures and that each bird ranges over thirty to fifty hectares. Even in Henry's day, when they were locally plentiful, kakapo were widely spaced on the ground, and the capture of each one involved much time and hard work. During the period April 1895 to December 1897, Henry transferred to Dusky's islands 474 kakapo, little grey kiwi, and 'roa', an average of more than fourteen birds a month — a remarkable feat, especially when one considers the very difficult field conditions he had to endure. Not only did Henry pioneer the translocation of endangered species, but even now he has probably transferred more rare wild birds than has any other person. Henry cannot be blamed for the failure of kakapo to survive on Resolution Island. Had the sanctuary been a little farther from the mainland, out of swimming range of stoats, the outcome might well have been quite different.

With modern technology on our side, and at this eleventh hour in the bid to save the kakapo, some important advances have been made. For instance, in 1974 the first high-quality tape recordings were obtained, and playing these at night has been a useful aid in locating kakapo. Light-intensifying 'scopes, with which one can actually see in the dark, were used in 1975 to observe for the first time kakapo at night, booming and displaying at their track and bowl systems. The knowledge thus acquired has an uncanny similarity to conclusions reached by Henry almost a century before. He once wrote that if he could come back at night with the eyes of a cat to a hilltop where kakapo tracks and bowls were to be found, what a

MacKenzie Basin.

During a "pit day" Dick Anderson tells me how the Wildlife Service intends to save the kakapo from extinction. Like many staff, he feels strongly about the bird's survival, having been involved in numerous expeditions since the mid-60s.

"The kakapo's a remarkable animal which must be preserved. The big hope for the future is transferring them to large, predator-free islands and the two most suitable are Little Barrier and Codfish Islands (the latter near Stewart Island).

"Those birds that have been taken to Little Barrier are doing well, but they haven't bred yet. In March 1986, 15 track and bowl systems were discovered on the summit ridges of the island, and at least seven males boomed during February and March. This is the first sustained booming since their transfer in 1981," Anderson says.

Codfish Island is possibly even more suitable for kakapo as the climate is closer to what the present population is used to, but it is yet to be completely cleared of possums and wekas. It is estimated that perhaps two years will see the last of these and the island will become fit for kakapo habitation.

But as the only breeding population lives on Stewart Island, where fewer than 50 birds are still at risk from cats despite the vigilance of Wildlife staff, isn't that a sufficient threat to remove the kakapo from there immediately and transfer them, even temporarily, to a safe haven?

Anderson answers that they are satisfied the cat problem is under control, at least enough not to warrant upsetting the birds by shifting them. Furthermore, even though the kakapo on Little Barrier are not breeding yet, there are high hopes that they will do so. Finally, time is on their side, for it is estimated that kakapo could live as long as 50 years although they breed perhaps only at one to four year intervals in normal situations.

It is the second to last day of my all too brief stay in the Transit Valley. The chances of finding kakapo in time-honoured ways are evaporating; modern technology takes over as we decide to locate one of the males (dubbed Talbot) fitted with a radio transmitter.

Talbot's booming area lies only a 100 or so metres below the camp, and so we start from there, pointing antennae shaped like a TV aerial in the most likely direction — but instead of descending, the "beep beep" signal comes from the right, across the valley.

For the next five hours we sidle across, through predominantly rata-beech forest inhabited by flocks of noisy kaka and where the going is much easier than the tortuous sub-alpine scrub not too many metres above.

Finally, about two kms from where we have started, the signals tell us Talbot is just below. As silently as possible we descend until the signal is arriving from all directions — the transmitter will not lead us precisely to the bird, but only provides a vague direction of its whereabouts. Usually dogs find it at this point.

By descending further, we soon realise that Talbot is now above us. We are on a dense beech-covered ridge, one side of which drops away sharply down to a waterfall. Every fern or moss under every rock and fallen tree becomes a kakapo . . . suddenly, a flash of wings and there he is under a log, attempting to bury himself deeper into his secretive world.

Anderson catches him at an awkward angle and cannot prevent the bird from gnawing painfully into his hand. After a bout of hoarse croaking Talbot calms down and placidly sits, his owl-like countenance seemingly expressing the wisdom of many years.

It is a special moment. The anthropomorphic sentiment that this and other Fiordland kakapo must be very lonely cannot help surfacing, nor the feeling that such a unique animal must be preserved.

In less than five minutes our business is done; Talbot is somewhat lighter than he should be for booming and breeding purposes, but otherwise he is in good condition. The moment he is placed onto the ground he crawls back under the log and adopts the freeze position characteristic of the species. It is the only defence it knows.

Up until now that posture has been no safeguard against marauding predators; today humans hold the key to the survival of this "old New Zealander" in what has become a battle against time. The boom of the kakapo has sounded out for thousands of years. Will it continue to do so in the 21st century?

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wonderful sight it would be — he likened it to a ballroom.

Odd creature

Modern research on the kakapo has confirmed many of Henry's contentions, some of which were and still are unusual, for the kakapo is indeed an odd creature. For instance, only in the last five years has it been possible to verify Henry's conclusion that breeding occurred only in those years when booming occurred, and that booming did not occur every year. This view, more than any other, was challenged or rejected outright by many authorities of the day (and even up to the present), and the disagreement raised doubts in many circles as to the validity of Henry's other observations. Henry was a skilful field naturalist and a meticulous observer, and he was well acquainted with the kakapo's unusual behaviour, which he had carefully studied over many seasons. He anticipated rejection of his views when he said 'this is one of the true stories that will not be believed in the future — can't understand it, won't believe it'. The doubts were not resolved in Henry's lifetime. However, his conclusions have been confirmed by the radio-tagging of females on Stewart Island during the last five years. It is indeed the case that females do not breed every year and that their nesting coincides only with those years when males boom intensely for two to three months. Intense booming occurs at one- to four-year intervals. Henry speculated that booming and breeding were related to the availability of food, though he was hard-pressed to justify his view for he found that the males' air sacs started to develop several months before the seasonal abundance of food. Recent research does in fact indicate that booming and breeding are linked to the sporadic heavy cropping of certain food species.

Gay Lothario

Further evidence of Henry's reliability as an observer has resulted from our recent studies, using light-intensifiers, of females at nests. Henry contended that the female alone attended the nest (the male 'knew nothing' of it, he said, and was a 'gay Lothario'). The conclusion was disputed by a number of the old naturalist's contemporaries, and ours! However, our studies in 1981 and 1985 — the only times nesting has occurred recently — show that incubation and care of the young are in fact undertaken solely by the female. Other observations noted by Henry have also proved to be equally accurate, and his reports and records have been invaluable to current conservation efforts. For instance, his descriptions of female kakapo enabled us confidently to identify the first female that we encountered on Stewart Island — probably the first seen since Henry's time. Similarly, his descriptions of nests, nestlings, and juveniles, have all been totally accurate and thus of immense help to us in the field. We have also found Henry's technique of hunting kakapo using a muzzled dog wearing a bell to be the only safe and effective method, and it has been successfully employed by Wildlife Service field staff. Similarly, his techniques for holding birds temporarily in captivity and of feeding captive birds have all been adopted by those involved in recent capture-and-transfer programmes.

Henry's writings, more than any other, have been indispensable in our field work. During the 1970s, while searching for kakapo in Fiordland, I would always take copies of Henry's reports with me; and on those rather frequent occasions known as 'pit days', when field work was impossible due to heavy fog, torrential rain, or snow, we would remain in our sleeping bags and study what he had to say. We never ceased to be impressed by the breadth and accuracy of his observations and the depth of perception of his interpretations.

Captive Rearing of Takahe

By Craig Robertson New Zealand Wildlife Service

For the past ten years the New Zealand Wildlife Service has been researching and preparing an intensive management plan dedicated to the preservation of the endangered takahe.

There are three parts to this plan:

- To enhance and expand the existing wild population and re-establish further wild mainland populations.
- To establish an additional population on a predator-free island.
- To develop a captive rearing station.

The third part of this plan is now fully operational at the Burwood Bush Takahe Rearing Unit, part of the Gorge Hill Scientific Reserve, a 1350 hectare area of red tussock and beech forest about 35 km east of Te Anau. One of the last remaining extensive areas of lowland red tussock, at present it is being managed jointly by the Wildlife Service and the Lands and Survey Department.

Significant increase

When the flightless takahe was rediscovered by Dr Geoffrey Orbell in the Murchison Mountains of Fiordland in 1948 the population stood at about 500 birds. By 1982 it had declined to an all-time low of 120 birds but now stands at approximately 180 wild birds — a significant 20 percent increase in numbers over the past two years.

In the wild, takahe usually rear only one chick each breeding season, yet most pairs have a two egg clutch. Most nests will have two 'good' eggs (fertile and developing); in some both eggs will be infertile.

Between 1982 and 1985 an egg manipulation programme was carried out, the aim being to ensure that each pair had a fertile egg. Eggs are 'candled' (shining a light through the shell) to determine the presence of an embryo. Fertile eggs were transferred to nests which had infertile eggs, and from each of fifteen nests one egg was removed and taken to Burwood Bush to be artificially incubated. From 1986 no egg transfers will be made, but instead whole clutches from 10 pairs will be removed for artificial incubation. It is hoped that the pairs which have had eggs removed will relay. This has already proved successful with several pairs.

Artificial rearing

Captive rearing methods and research carried out on takahe at the National Wildlife Centre at Mt Bruce and the Te Anau Wildlife Park have helped develop the new technique. At present the National Wildlife Centre has six adult birds and this year, for the first time, twin chicks. Altogether eight takahe chicks have been reared to independence at Mt Bruce.

The Wildlife Service first attempted artificial rearing of takahe (isolation technique), at the Te Anau Wildlife Park in a temporary

Top: **A takahe emerges out of a tussock igloo as a Wildlife Officer comes in from the other side in search of fertile eggs. One of the two eggs normally laid is either transferred to a nest with infertile eggs or taken back to the incubator at Burwood Bush. The remaining egg is left on the nest to hatch.** *Photo: Craig Robertson*

Bottom: **Takahe eggs hatching in the incubator.** *Photo: Craig Robertson.*

Top: **Takahe chicks reared artificially have as little human contact as possible. Here a model surrogate parent made from fibreglass stands aside while a puppet feeds the chicks a range of food, including tussock, potato, dog and baby food.** *Photo: Craig Robertson.*

Bottom: **Near Lake Te Anau, the Wildlife Service has fenced off a 10-hectare area against predators. Plans are to do likewise for 800 hectares, although the cost could be enormous.** *Photo: Craig Robertson*

The takahe's method of feeding actually promotes tussock growth, whereas wapiti grazing stunts the plants. *Photo: Peter Moore*

set-up over the 1982/83 breeding season.

From four eggs, three chicks were successfully raised. These birds are now in captivity at the park. In the 1983/84 season six chicks were raised and during 1984/85 three chicks. These nine takahe were transferred to Maud Island in the Marlborough Sounds in April '84 and June '85 as a trial for the establishment of takahe in a pasture grass/island situation.

Permanent rearing facilities have now been built alongside State Highway 94 overlooking the Burwood Bush Reserve, and, in November 1985, 16 eggs were brought out in three transfers from the Murchison Mountains. Eggs brought out of the mountains are placed in incubators in an air-conditioned room. Once a day every egg is candled and accurately weighed. Hatching dates can then be calculated, based on the size of the egg and how much weight loss has occurred.

As the incubation period of 28–30 days nears its end, it is amusing to watch the eggs rocking about and to hear the baby takahe cheeping away inside the shell. At this stage, taped brooding calls of a parent bird are played through a speaker in the incubator. Just before the chick breaks completely out of the shell it is removed from the incubator and placed under a fibreglass model surrogate parent in a specially designed brooder. This is to prevent imprinting to humans when the chicks are very young and to imitate as near as possible the rearing conditions in the wild.

Landscaped floor

The 'parent' is fully insulated, has a built-in speaker through which brooding calls of the parent are played, and a pet warmer pad is used to keep the chicks warm. Each brooder has a fibreglass landscaped floor, a small pond and a pot-planted tussock. A one-way glass observation window allows the staff to monitor the birds without themselves being seen by the birds.

The brooders have been designed with two identical sides separated by a pulley-operated sliding door so that the chicks can be moved into the other side to allow regular cleaning of each brooder. The artificial lighting is programmed to coincide with daylight hours, and helps to keep the brooders at a constant temperature. Each brooder houses up to four chicks of a simi-

The rugged Murchison Mountains, last outpost of the takahe which was dramatically rediscovered in 1948. *Photo: Peter Moore*

lar age. It is important that there be as little age variation as possible since older chicks become dominant and attack the younger ones.

Last season all 16 eggs hatched but one chick died minutes after hatching at the wrong end of the shell. Another chick died from unknown causes when only a few days old. A further chick died some weeks later after failing to gain any weight or strength.

Maternity annexe

The brooder room resembles a maternity annexe with hungry, noisy, cute little balls of black fluff quite unbalanced on their oversized pink feet. Feeding the chicks is a long and involved process. From 7 a.m. to 10 p.m. the chicks require food once every half-hour. The nutritious diet consists of tussock (*Chionochloa pallens* and *C. rubra*), clover, carrot, cabbage, potato, dog food and 'Farex' baby food. This is all finely chopped, mixed together and served in conjunction with a plateful of moths, all devoured in a matter of minutes. Puppets are used to feed the chicks — a blue material sleeve with red wooden beaks — while a small speaker held in the hand emits a deep guttural takahe feeding call. It can become frustrating trying to feed equal amounts to the little white-tipped beaks of squabbling baby takahe. Between feeds, many hours are spent preparing the food, including the tedious job of picking thousands of tussock tillers and stripping the base down to the juiciest inner core. During the first three weeks of feeding it is critical that the food does not contain coarse fibre as this may block the chick's digestive tract and lead to death.

Strict hygiene

Visitors to Burwood may well wonder at the people who look like butchers in their white coats and white gumboots. Well, they are actually Wildlife Service staff and it's all in the cause of strict hygiene. A foot bath before entering the building is also essential. These precautions are to prevent diseases from entering the reserve, such as erysipelas which comes from poultry and pigs, and avian tuberculosis. For this reason the reserve is closed to the general public.

The chicks are allowed to move to outside pens at about six weeks of age. At this stage they are about half-grown. The outside pens have two metre-high solid fences surrounding them and birds are watched through one-way observation windows.

They can support themselves by feeding on the tussock in the enclosures, although supplementary feeding is also necessary. The birds remain in these enclosures for four to six weeks.

During the whole period, a person is required to live in the brooder building to keep an eye on everything.

Perhaps the most interesting time was when the birds were released onto the reserve in March of this year. Ten hectares of the reserve have been fenced off with a predator-proof barrier of wire mesh with three electric wires on outriggers at the top and two on the bottom. The wires are connected to a solar power unit which can discharge 10,000 volts, and to a security alarm system. The area is also being intensively trapped for stoats, cats and possums but it appears from the few catches that predators are probably in low numbers.

Behave like wild takahe

The birds released have been watched periodically from hides constructed in the area, and they appear to have adapted well. They are finding their natural foods easily and are behaving just as most wild takahe do — curious but wary of humans. They react instinctively to falcons and hawks flying overhead.

Efforts to prevent imprinting appear to have been successful. We will have to wait a further two years, when the birds will be of breeding age, before we know if the programme has been a total success.

It is hoped that by then half the total of semi-captive takahe will have been released into Fiordland's Glaisnock Valley (in the Stuart Mountains just north of the Murchison Mountains.) This will establish a new population in the wild and thus act as a safety measure should the Murchison Mountain population, for any reason, fall.

The remaining takahe reared at Burwood will form two separate semi-captive populations. It is envisaged that 800 hectares of the reserve set aside for takahe will eventually be completely predator-proof fenced. At present only small extensions take place each year due to the enormous cost.

A bright future looks certain for the regal takahe, and perhaps other species later on, with the establishment of the Burwood Bush Takahe Rearing Unit and associated reserve area.

Whose rights?

A battle is being waged in Fiordland over the endangered takahe — and yet it need not be. At the time of writing the Deerstalkers Association is threatening a High Court injunction to stop the Wildlife Service re-locating takahe in the Glaisnock Valley of the Stuart Mountains. It is likely their injunction will succeed and the issue will only be resolved by court proceedings so lengthy as to prevent takahe liberation in the 1986/87 summer.

Many deerstalkers fear that, because takahe and introduced wapiti compete for the same tussock food, pressure will go on to exterminate all wapiti from the area where the takahe are re-located.

However, their fears are largely groundless, as groundless as their claim that the takahe is a dying species which is more at home in lowland podocarp-broadleaf forest.

There is no question that wapiti numbers will have to be kept low in order to maintain the success the Wildlife Service is achieving with its takahe programme – a 20 percent annual increase in takahe numbers over the last two years has seen the population jump from 120 to 180 birds. But at the same time it would be flying in the face of reality to expect a total wapiti eradication programme to be successful. Unfortunately, wapiti and the deer they have hybridised with are here to stay because, despite intensive hunting it has simply proved impossible to eliminate the bush dwelling animals. All we can do is seek the lowest possible populations.

There is also no question that native, endangered species like the takahe take precedence over wapiti. A proper sense of priorities puts the takahe first – it requires a specific habitat (mid-ribbed snow tussock such as that found in the Glaisnock-Edith catchment) if it is to survive, whereas the wapiti is capable if living anywhere in New Zealand, and is widely farmed. The takahe is an animal in harmony with its environment, with its curious method of feeding which actually promotes new tussock growth rather than stunting tussocks as the wapiti grazing does.

At present the takahe stands the risk of extinction should avian disease attack the only wild population in the Murchison Mountains – good reason why a second, separate population should be established.

A compromise would see hunters continuing to shoot wapiti in the Glaisnock where the North American deer would be kept at low numbers in order to give the second takahe population a chance of establishing well. It would also provide a wild population of takahe for the tramping public to see. At present the Murchison Mountains special area is out of bounds to the public.

Both animals hold special attractions for New Zealanders; in Southland feelings run high on both sides of the issue, as evidenced by the large sign alongside the Te Anau highway proclaiming: "Wapiti belong in Fiordland." This attitude was reinforced on the recent *Closeup* TV programme when a Deerstalkers Association representative made the following sad remarks: "You can imagine how a stalker would feel looking for a wapiti . . . it would be bad luck for any takahe he came across. I don't think this would happen with any native birds, the ones that are in there naturally, but any that were put in there like hatchery pheasants, people may regard them the same way."

This issue must be resolved urgently. The second takahe population must be established as soon as possible. Any delay is a tragedy, risking the loss of the species forever.

Gerry McSweeney, Conservation Director

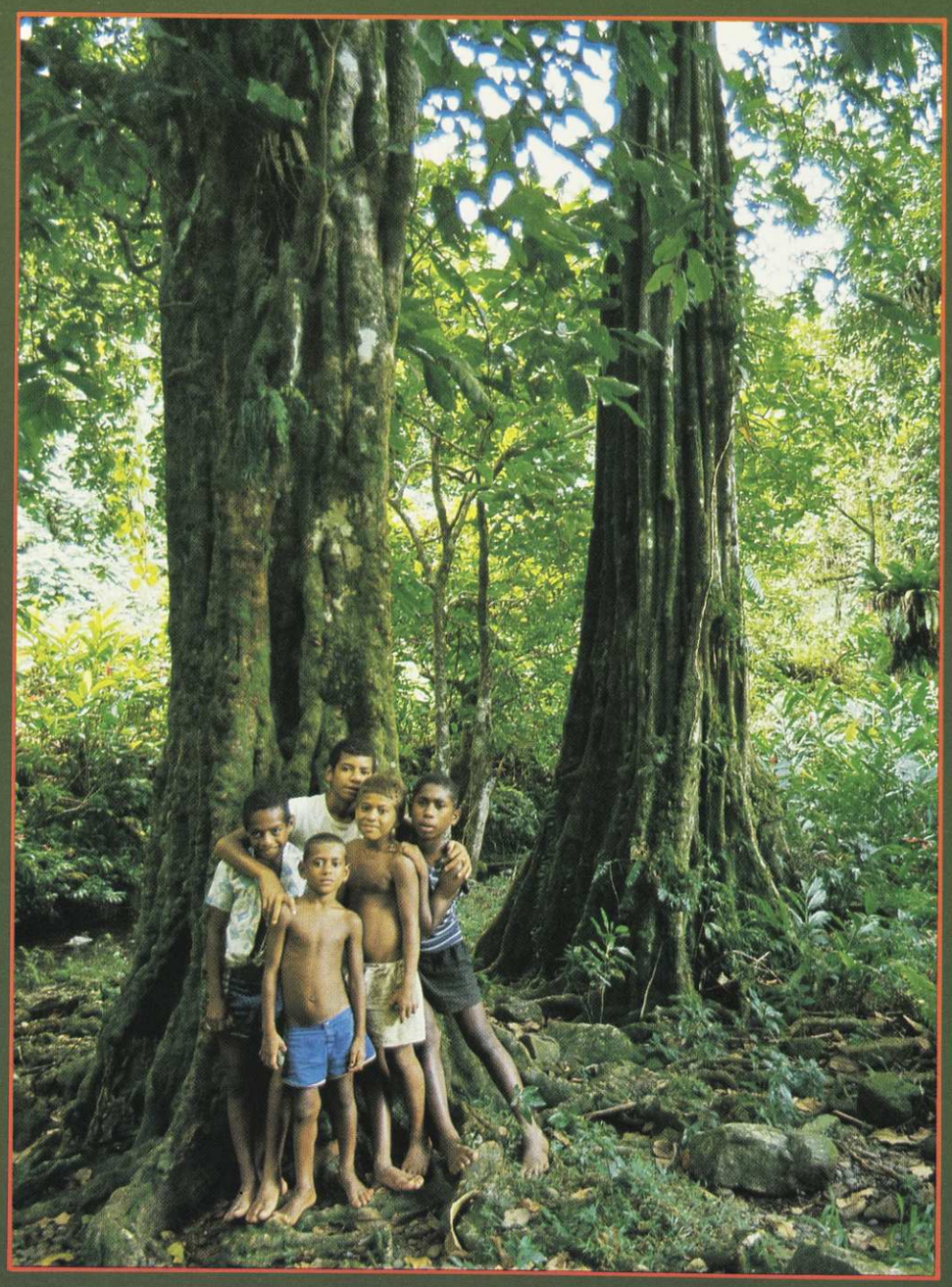
In the Rainforest

By Chris Rose

Catherine Caufield's In The Rainforest *is the first readable book which answers the key questions of rainforest destruction. Based on her extensive research and two years spent visiting the ruins of rainforests from Bali to Brazil, it gives a clear and horrifying account of what must be humanity's greatest ecological blunder.*

Ms. Caufield is a news reporter who writes well and can tell a good story. If it does nothing else but put on record the ways and means of rainforest destruction, her book is undoubtedly a major contribution to conservation. It may also spur action to save the rainforests but in most places it is already too late.

Ms Caufield points out that rainforests originally covered 14 per cent of the earth's surface but in recent years they have been reduced to less than half that. In countries such as Ivory Coast, 90 per cent has been lost in 30 years. Satellite pictures show that 60 per cent of the total deforestation in Brazil up to 1978 took place in just three years from 1975. Forest and Bird *here reproduces an extended review of the book from the magazine* Envirowatch. *The book is published by Heinemanns ($30.75).*



Will these forests still be in existence when these children become adults? Pacific Islanders are becoming aware that the wholesale logging of their forests threatens their traditional lifestyle, and only benefits multi-national logging companies.

By 1990, says Ms. Caufield, lowland rainforests of peninsular Malaysia, Thailand, the Philippines, Guatemala, Panama, Sierra Leone and the Ivory Coast, will have been reduced to a few remnant patches.

Mainland India, Haiti and Sri Lanka have already lost all their primary rainforests.

Indonesia will lose 10 per cent of the forests it had remaining in 1981 by the year 2000. The Philippines will lose 20 per cent, Malaysia will lose 24 per cent, and Thailand will lose 60 per cent by 2000. In Africa, Nigeria will be completely deforested by 2000, Guinea will lose one third, Madagascar 30 per cent, and Ghana 26 per cent of their few remaining rainforests. In Latin America, Costa Rica will lose 80 per cent of its 1981 rainforests.

Honduras, Nicaragua and Ecuador will lose more than one half; and Guatemala, Columbia and Mexico will lose one third of their last rainforests by the end of the century.

Although rainforest fertility is strictly limited, water and light are abundant: a West African rainforest receives as much rain in an hour as London does in four months, and the Amazon is so vast that it flows fresh into the Atlantic for over a hundred miles.

Species which take a year to mature in the USA, do so in the rainforest in only 23 days.

This high-speed cycle of life and death has produced most of the world's species: Ms Caufield describes a rainforest lake the size of a tennis court which has more fish species than all of Europe.

Four hundred unique animal species, she says, are estimated to rely on each rainforest tree species.

Destructive logging in the tropical rainforests of the South Pacific could see the end of lowland forests in our lifetime. Our Pacific Forest Conservation Coalition is developing a strategy to prevent such a tragedy, using funds from our recent appeal. *Photo: Guy Salmon*

Native people's knowledge of rainforest plants and animals as foods and medicines is now becoming celebrated. The author reports that Indonesian natives can find 4,000 wild food plants in the forest.

Similarly, malaria is only effectively treated with quinine bark of the cinchona tree of Peruvian rainforests. It took explorers from 1935 to 1944 to obtain and grow viable seed of the right strain, and synthetic substitutes are now losing their efficacy.

Yet it is engineers, development planners, generals, accountants, politicians and economists who are now in charge of the rainforests and not native people with knowledge of how to use them sustainably.

As *In The Rainforest* makes plain, almost everything that developing countries do to rainforests is heavily influenced by aid from the North, loans from the North, and the strings attached.

It is still mainly the North which owns large logging concerns and the North, notably Japan, which consumes an enormous amount of rainforests, is safe from development pressures.

"About 2 per cent of the world's rainforests have been declared nature reserves or national parks. The vast majority of these are completely unprotected, and some are leased for logging or other disturbing activities," notes Ms. Caufield.

What the ultimate consequence of rainforest destruction will be, nobody knows but, although they may include dangerous changes to our climate and the loss of life-saving drugs or crops, the first that many people will know is likely to be when their Christmas supply of brazil nuts disappears.

For brazil nuts, it seems, are typical rainforests products. Faced with a trade already worth US$16M a year in exports to the US alone, Brazilian businessmen have tried to industrialize production by creating nut plantations.

This is how Catherine Caufield describes the outcome:

"The trees were planted, they grew well, and in due course they flowered. But they produced no nuts.

"No one knows how brazil nuts are pollinated but they are visited regularly by euglossine bees, the same ones whose mating rituals depend on certain chemicals available only from a few species of epiphytic orchids.

"The plantation had none of these orchids, nor did it have the other plants on which bees depended for food. No bees, no brazil nuts.

"Brazil nut trees must grow in a mixed forest, one big enough to encompass all the other species in the life-cycle of the trees.

"Exactly what they are is still unclear, but they include not only the euglossine bees and the insects they may need (such as those which pollinate the epiphytic orchids) but also the rabbit-sized rodents called agoutis, which are the only creatures that crack open the hard fruit case that contains the valuable brazil nut.

"The seeds need agoutis to free them from their outer coverings. As yet no one knows what plants and animals the agoutis depend upon."

So it looks as if we will go on having brazil nuts only just so long as there are intact forests left in which to gather them. We may yet find a way to exploit the rainforests as well as to admire them, if only we can learn to gather the genes which create drugs, enzymes, food plants and even timber crops, in nuts, by keeping rainforests as rainforests, and not dismantling them.

Through a lens naturally

Successful nature photography is a fusion of three skills – the ability to see pictures, to handle a camera quickly and confidently, and to find and approach the subject. Those fortunate enough to own a copy of The Ancient Islands *(Port Nicholson Press, text by Les Molloy), will recognise that Brian Enting possesses the above three skills in abundance, his outstanding photography contributing to arguably one of the finest natural history books on New Zealand. In this article, he outlines some of the essential ingredients for capturing those special shots.*

New Zealand birds are notoriously difficult to photograph, especially in the forest. A telephoto lens and large reserves of patience are the main requirements of successful bird photography. The wood pigeon (kereru) is a little easier than most forest birds to capture.

The surf crashed repeatedly on to the head land at Karekare on Auckland's west coast. It was exciting dodging the waves and experiencing the thrill of the powerful wave action. I retreated to safer ground to change a lens, making what was almost a fatal mistake – I turned my back on the sea. Next minute I was under water, gear and all. Fortunately I have lived to tell the tale, but later I learned that locals seldom make that mistake and it's usually the visitors who are drowned.

My photographs were literally a wash out, and some of my gear ruined beyond repair, all in less that 60 seconds. Next day I salvaged some close ups of safer topics.

This incident contrasts with a bush fire just beyond the borders of Carnarvon National Park in Queensland. Using a very wide angle lens – (15mm) – to maximise the depth of the drama of the fire, I darted over the burning coals to get close to the fire while ensuring at all times that an escape route was clear. As the fire ignited fresh patches of vegetation, it flared, the heat scorching my skin and eventually forcing retreat.

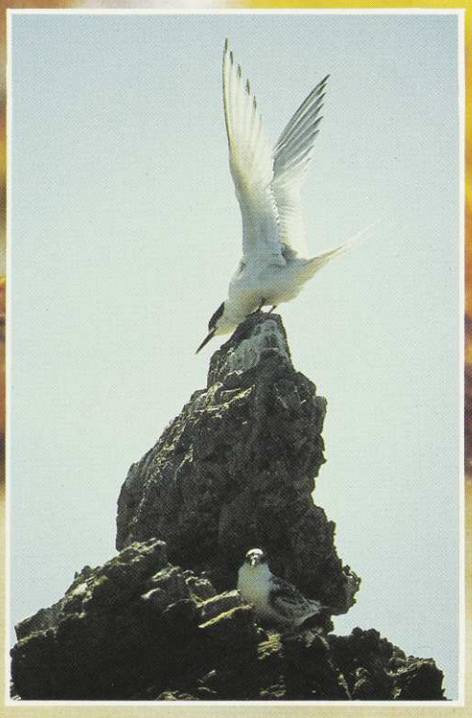
Both of these incidents involved risk, one was calculated, the other not. During both incidents I was working very quickly, the adrenalin pumping through my system as I made quick decisions and called on all my photographic training and intuition to catch the right moment.

Of course nature or environmental photography is not all drama and excitement. In fact it requires a great deal of preparation and patience, involving long periods of waiting. The photograph of the white-fronted tern reproduced here is the result of a reconnoitre several days before, a 500mm lense, heavy tripod, three and a half hours of waiting and 72 shots.

Lifelong fascination

Fundamental to my environmental photography is a lifelong fascination with nature and especially the processes of nature. I simply love the subject and therefore three and a half hours photographing one bird is pleasure, combining the enjoyment of observation with the thrill of the hunt. The great advantage is that the trophy is a photograph that can be shared with others, while the subject remains alive and undisturbed.

It is terribly important that nature photographers respect their subjects and have a conservation conscience. There have been numerous times when I have withdrawn from a situation without a photograph rather than destroy something through insensitivity. The most recent inci-



dent was in a remote area of Mount Tongariro where I was photographing thermal activity. The ground was so fragile and spongy that it was like walking on freshly baked bread. Each additional step left an imprint, and I didn't know how long it would take for the ground to recover. Therefore I withdrew.

So what does it matter, you may ask, who would know? It's a matter of conscience, and I hope that readers will share my respect for the wild areas and the species that live there.

Today photography is a popular way of recording our interests, actions and surroundings. It is available to everybody. It is also a superb medium for recording natural history, whether we are photographing landscapes or the minute flowers of many of our native plants. Everybody can take photographs and many do. Even though I have a studio and a variety of photographic gear I try to keep things simple. Obviously difficult subjects demand more complex approches, but many subjects can be approached with very simple equipment.

Basic equipment

The most versatile and accessable modern camera is the 35mm SLR with interchangeable lenses. There are many good brands to choose from. 90 percent of the photographs that I take are with three lenses: 55mm (micro Nikkor), 20mm wide angle, 200mm telephoto. For those starting out, the basic camera and a standard lens are fine, and allow plenty of scope. A tripod and cable release are essential for many shots, especially close ups and telephoto shots. Remember that your feet can take the place of lenses on many occasions. Simply get closer to, or further away from your subject.

Good photographs must first be recognised before they can be captured. This highlights the difference between looking and seeing. Everybody looks, but not everyone sees. Many times I have been in the field with people and been fascinated by the difference in people's powers of observation. I have heard people say "There is nothing to photograph here", when they've almost been standing on an exquisite lichen or flower. Taking photographs, like many other pastimes, requires practise and warming up. A sportsman wouldn't dream of competing without a practise or warm up. Photography is no different. Unfortunately our education seldom teaches us to really observe, so many of us have been left to teach ourselves. There are plenty of good books on photography and photo-

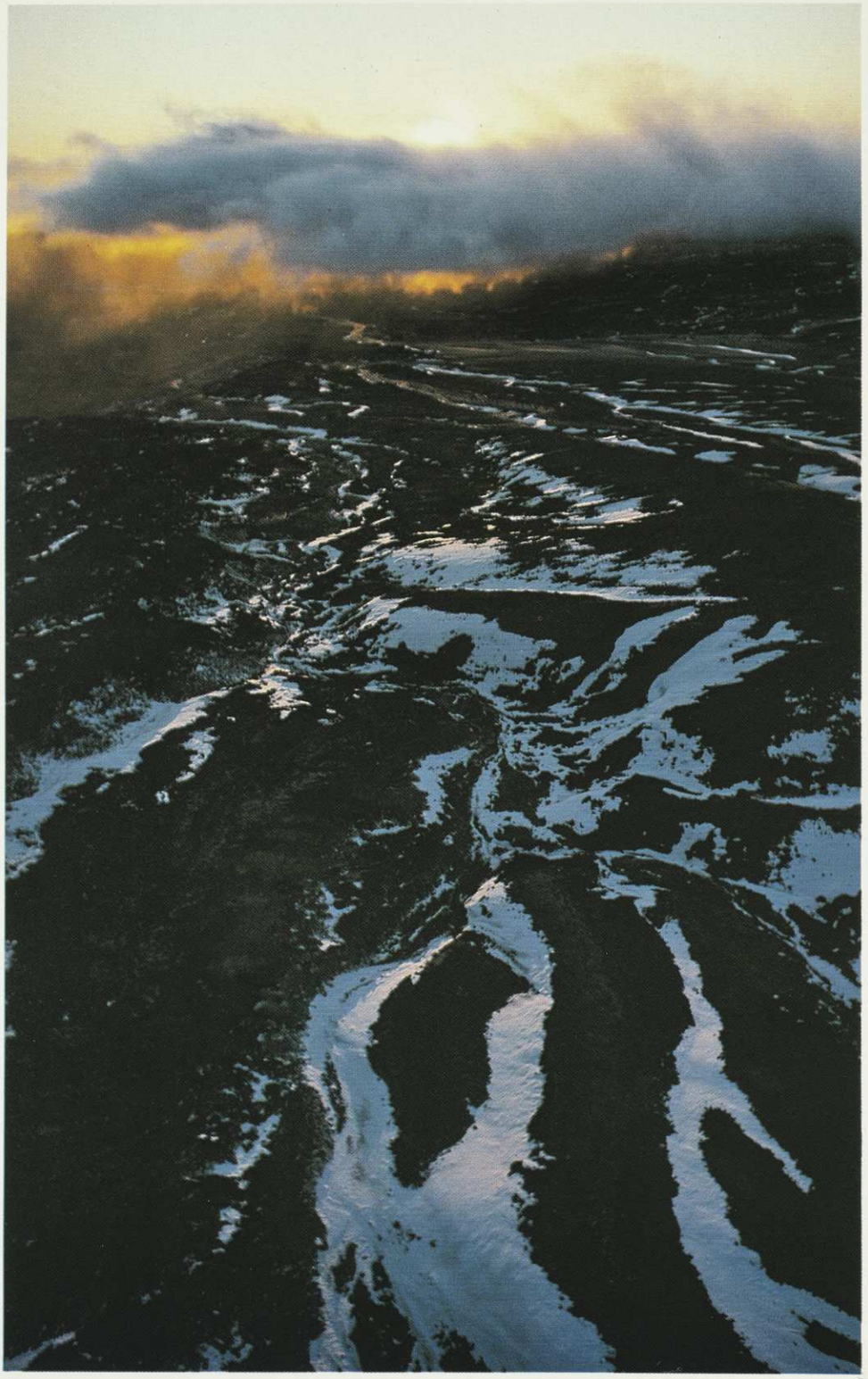
Top: **A forest gecko photographed in Tararua State Forest Park. Although quite common, the gecko is difficult to find because of its camouflage. Photographing such animals is a delicate business; they must be carefully handled.**

Inset: **The delicate forked tail of the white-fronted tern has given it the name of "sea swallow". Such beautiful photos as these are the result of much hard work – in this case a three and a half hour wait and 72 shots.**

Above: **Using a wide angle – 15mm – lens, the author has here moved in very close to the shrub fire, involving the viewer in the drama. Near Carnavon National Park, Queensland.**

graphic books of natural subjects to study if you are interested. However, there is no short cut, anymore than there is in any other pursuit requiring skill. In spite of this we can all still take photographs that will give us a great deal of pleasure without labouring over technicalities. As already stated, anyone can take a photograph; the differences come in the levels of quality.

Experience is our best teacher. All the books, articles and courses in the world will not replace real life experience – give it a go! If it doesn't work, analyse the mistake and try again. Minimise the number of variations in your equipment and technique. Stay with a single type of film until you understand it completely, and try to avoid being an "equipment freak", who tries some new lens or camera frequently. I realise that there are people who are more interested in the equipment than the results.



Early morning, Rangipo Desert, Tongariro National Park. In this case the photographer had to work fast before the dramatic lighting conditions disappeared.

That's fine, but I am not writing for those people now.

Be prepared

"Do you photograph to a shot list or do you just go out and look for subjects," is a question I am often asked. The answer is – both. When on assignments I have a list of specific subjects to work to, and obviously try my best each time. However, one doesn't wake up in the morning and say "today I am going to create a masterpiece;" it doesn't work that way. Remember what I wrote about preparation and warm up. My best photographs are usually opportunistic, but I have nearly always been through the warm up stage – I am on location; I've prepared my gear; I've been working hard for some time. When the chance comes I am prepared – well mostly. As Lois Pasteur said "Chance favours the prepared mind".

Many readers I am sure will share my fascination for our wonderful forests and many will have taken photographs with disappointing results. Photographing inside forests is often difficult because of the contrasts between the dark shadows, and the light which penetrates the canopy. In spite of the tremendous improvements, modern film still has difficulty holding detail in the shadows while exposing correctly for the canopy. As photographers, we have to choose what part of the photograph is more important, and be prepared to sacrifice the rest. One of the basic rules of photography is that it is better to underexpose for colour photographs than to overexpose, and the reverse applies to black and white. Most readers will have experienced the bleached out look of an overexposed colour slide, and realised how unsatisfactory it is.

Another rule of thumb that is useful to remember concerns the focal length of lenses and whether or not they can be hand held, without camera shake, which results in blurring. The rule is this. The minimum shutter speed for a hand held photograph should match the focal length, ie, a 200mm lens requires a minimum of 1 200th of a second. The rule applies particularly to telephoto lenses.

Let's return to photographing the forest. What are we trying to achieve? Do we want forest scapes? If so we will need a wide angle lense, say 20 or 28mm, and in most cases a tripod, because with many films we will need a 1 to 5 second exposure. Try hand holding for that long! If on the other hand we want to photograph details in the forest floor, or a tree trunk, we will need a standard or macro lense, but we will still need a tripod. A tripod allows for longer exposures which in turn means that a smaller aperture of around F11 to F22 can be used. The advantage of a small aperture is a sharper photograph with greater depth, and this is usually desirable in close ups.

Wildlife – special problems

Birds and animals pose special problems for the photographer and while a standard 50mm lens (for a 35mm camera) can secure some photographs, telephoto lenses are generally necessary. Again, if we ignore the more exotic lenses, a 200mm telephoto lens is a useful tool if combined with a hide or good field technique. When photographing animals there is again no substitute for experience and knowledge of the subject. Some birds, for instance, are reasonably tolerant of humans, while others can only be approached with the use of hides. Insects, in my experience, require studio or similar settings, plus electronic flash to freeze their movements, as well as provide enough light. Seldom is natural light sufficient with these small moving subjects. A great deal of patience is required here, and very careful handling of specimens, especially butterflies or moths, that become damaged so easily.

Nature photography is a journey of discovery, with new and fascinating places or species continually refreshing one's enthusiasm. As we look for subjects to photograph, our visual senses are sharpened, and we actually begin to observe more clearly. With this heightened awareness we are better able to take advantage of those special occasions when they occur. While finishing a book on Tongariro National Park recently I was flying over the Rangipo Desert at dawn in a helicopter. Very aware that these vehicles are expensive to hire, I began working very quickly. The photograph accompanying this article captures the drama of that August morning. In fact the lighting only lasted a few minutes before the scene was transformed to dull tones, but I had the shot – forever.

Our precious corner of the world

New Zealand. Geographically isolated, but considered one of the better places to live in the world. And our neighbour, Antarctica. Bleak but beautiful, mysterious and magnificent. BP involves itself with this stunning corner of the world, in the protection of endangered species. In New Zealand, with the continued well-being of the Kakapo, an indigenous bird, and in Antarctica — the last unspoiled continent — with the protection of penguins. It's nice to be involved, and extremely gratifying to know that our modest input helps protect this precious corner of the world.

Putting our energy into the environment.

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MOAWHANGO
ECOLOGICAL DISTRICT
a biogeographic hot spot

by Geoff Rogers

The Moawhango (Maori: many moa) region, sandwiched between the Tongariro volcanoes and the encircling Kaimanawa, Kaweka and Ruahine Ranges, is a region of major biogegraphic significance. Why are so many South Island upland herbs found only in the Moawhango intermontane basins and nearby regions in the North Island? For some reason 150 or so plants shun the ostensibly suitable habitats south of the central Ruahines in the North Island. All these coincident plant distributions are too numerous to explain away as the result of chance long distance dispersal.

If biogeography raises awareness of the Moawhango, the landscapes are just as compelling. Pictorially these landscapes have their closest affinities with the Matiri Plateau in Northwest Nelson and parts of the Central Otago block mountains. Moawhango landforms are a series of montane – subalpine sandstone plateaux cut by deep river valleys. Most sandstone blocks are capped by high fertility limestone that also outcrops as erosion resistant verandas in escarpment walls. Next in the sequence of geological life is a two-metre deep mantle of andesitic ash deposited by westwind drift from the Tongariro volcanic eruptions since the last glaciation some 14,000 years ago. This brown ash has blanketed the region, smoothing the contours and producing gentle relief patterns.

First fire then discing:

The impact of Polynesian and European fires is indelibly imprinted on these landscapes. An extensive mixed kaikawaka and beech forest that once dominated the uplifted plateaux has been reduced to just peripheral remnants by early Polynesian fires stretching from Waiouru to the Northwest Ruahines.

Moreover, as vegetation healed from this period of burning 5-600 years ago, a further period of ecologically pernicious firing awaited, with the arrival of European pastoralism. Shrub-tussock successions recovering from Polynesian fires were converted to homogeneous red tussocklands. European fires carried well through the highly inflammable *Dracophyllum*, mountain toatoa and red tussock. However, as shrubland fuel loads were lower the ensuing incineration only lapped at the fringes of forest pockets. So the distribution patterns of forests we see today are much as prehistoric Polynesian travellers would have viewed on cross-country sorties. A popular route from Karioi and Moawhango traversed the plateaux to Kuripapango and on to Napier. The Taihape-Napier road alignment logically follows this trail through the Gentle Annie saddle separating the Kaweka and Ruahine ranges.

Top: **Makirikiri tarns – site of special plants near Aorangi on the Mangaohane Plateau. The bog pine-dominated shrubs on the island are all that remain of the pre-Polynesian vegetation, protected from fire by the tarn. In the background, the mist-shrouded marine sediment, Te Rakaunuiakura, marks the border with the Ruahine State Forest Park.** *Photo: Quentin Christie.*

Bottom: **Secreted away east of the Desert Road in army territory, the intermontane basins of the Moawhango River are home to a number of disjunct upland plants. Valley basins are mantled in Taupo pumice.** *Photo: Quentin Christie, Soil Bureau, DSIR.*

Inset: ***Myosotis Sp. (M. pygmaea var. glauca)*** **restricted to the upper Moawhango headwaters, is cryptically camouflaged against river alluvium.** *Photo: Geoff Rogers.*

Much of this red tussockland heritage has disappeared under plough and disc in the last 15 years, marking the pinnacle of subsidised land conversion. Highly productive ryegrass and clover replaced red and hard tussockland. The conversion programme clawed its way up to a staggering 4,000 feet — the winter snowline. Successful pasture establishment demands heavy superphosphate applications to correct the inherently low calcium and phosphate levels in these andesitic ash soils. With the removal of Land Development Encouragement Loans the tussockland conversion machinery is now in cold storage. What remains of the natural landscapes?

Tucked away in remote corners are landscapes largely unaffected by farming. At diametrically opposite ends of the district, the Waiouru Military Reserve and the Mangaohane Plateau in the Northwest Ruahines have landscapes rich in natural values. Other landscapes offer a pleasant blend of natural elements and productive pasture and are no less pleasing to the eye. Whereas the traveller on the Taihape-Napier highway 15 years past was flanked by undulating red-tussock vistas, today one must focus to infinity on surrounding ranges to see landscapes rich in natural features.

Non-forest habitats

Although ubiquitous kaikawaka forest with scattered enclaves of beech blanketed the plateaux, three other habitats are inherently hostile to forest. Broad, shallow concave basins have sufficiently high water tables to form peat bogs and tarns. Secondly, in deep wide river valleys, cold air drainage and unstable stream levees also support open vegetation. The third non-forest site is cliff faces, dominant in greywacke river gorges.

These habitats are important for two main reasons. Firstly they functioned as sources for shrub and tussock species colonising the deforested plateaux. Secondly, as sites of the biogeographically special plants, they preserve, albeit precariously, the assemblage of herbs and grasses found only in the Moawhango and nowhere else in the North Island.

Three species are endemic: a low shrub *Loagania depressa* has been found only once in 1845 north in Waiouru by William Colenso, the first Pakeha to visit the region; the others are a tiny buttercup and a biddibid.

A secretive group of eight species found in the Moawhango River headwaters in the Waiouru Military Reserve have a markedly disjunct distribution: they occur in the South Island but nowhere else in the North Island. The grass *Argostis imbecilla* grows east of the Desert Road and in Otago. Seasonally arid stream levees and very low "bowling green" like turfs are the favoured habitats. Some 1800 years ago the Taupo Pumice eruption inundated these intermontane basins with a choking blanket of pumice. Consequently such habitats are now very restricted and the status of these North Island distributions is therefore realistically described as precarious.

Curious appearances

A further seven species from the Mangaohane Plateau just east of Aorangi mountain also occur nowhere else in the North Island. Here, peat bogs, stream and tarn margins and damp, periodically flooded depressions are the specialist habitats. These plants include the eyebright, *Euphrasia disperma* which spreads through sphagnum moss on the raised margins of tarns at Reporoa Bog and Makirikiri Tarns.

It curiously appears again in central Westland e.g. Denniston Plateau. *Ourisia modesta* is known from only one shaded stream bank at Ruahine Corner, and is recorded at Gouland Downs (Northwest Nelson), Lake Alabaster (Fiordland) and on Stewart Island. These special plants in concert with some 70 other mainly non-forest species are confined to the central North Island mountains north of Cook Strait. Sixty other slightly more widespread species have southern North Island limits in the central North Island mountains. To what can we ascribe these strange distribution patterns?

Could these plants have jumped the lower North Island in a migration north from the South Island? The usual seed dispersal methods are wind and birds. Why then do suitable areas between the South Island and Moawhango not support these species? We may search for historical explanations. Pleistocene glaciation is out as only confined alpine peaks in the Tararuas and Tongariro mountains supported glaciers. Two geological upheavals have, however, obliterated old lower North Island landmasses in the last eight million years.

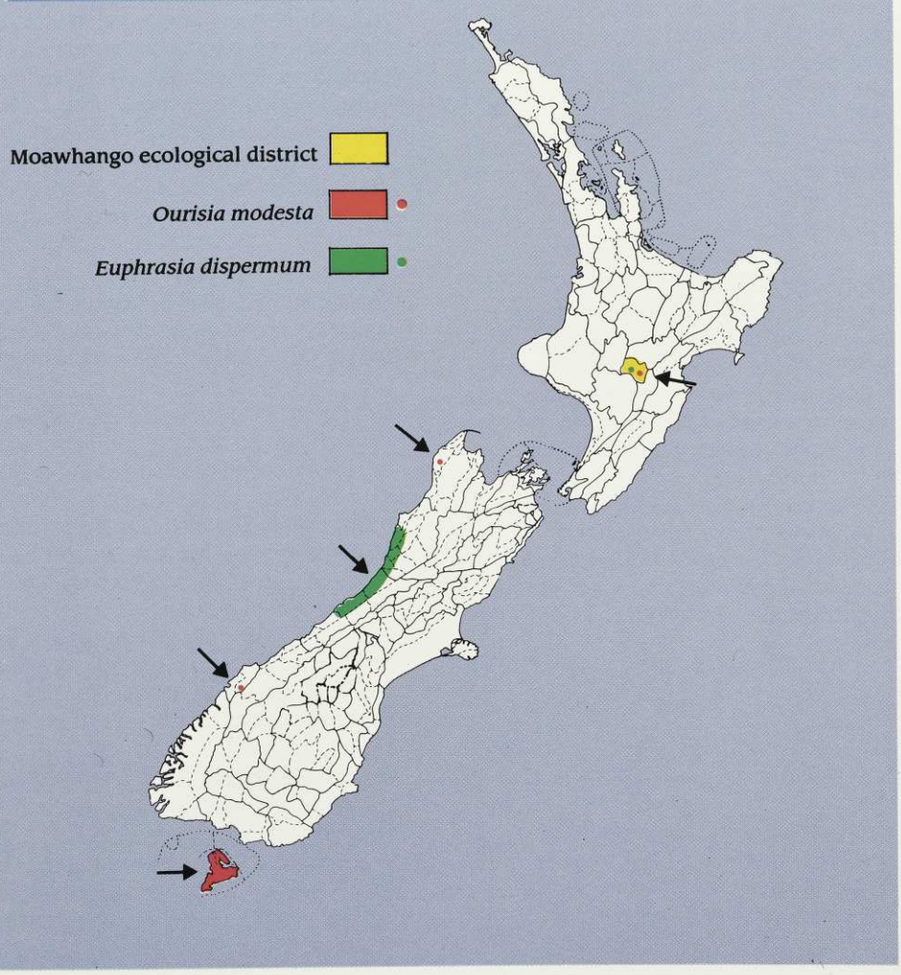
Tectonic upheaval

Geologists believe much of the lower North Island was submerged below sea level in the late Miocene-Pliocene, 8-2 million years ago. Land eventually re-emerged and an intensive period of tectonic upheaval, resulting in the uplift of the Tararua and Ruahine Ranges, started 1 million years ago. The biogeography suggests the central North Island region, including parts of the Moawhango and northern Ruahines, escaped marine inundation and acted as centres of biotic survival. Even if refugia existed in the region of the Tararuas the latter period of mountain building has acted as the "last straw", as habitats of these old landmass plants do not exist there today.

Biogeography and Conservation

The Protected Natural Areas programme seeks to preserve the best of what remains of our natural ecosystems and landscapes. Some urgency should be accorded the Maowhango District. Only one private scenic reserve and half of Hihitahi State Forest

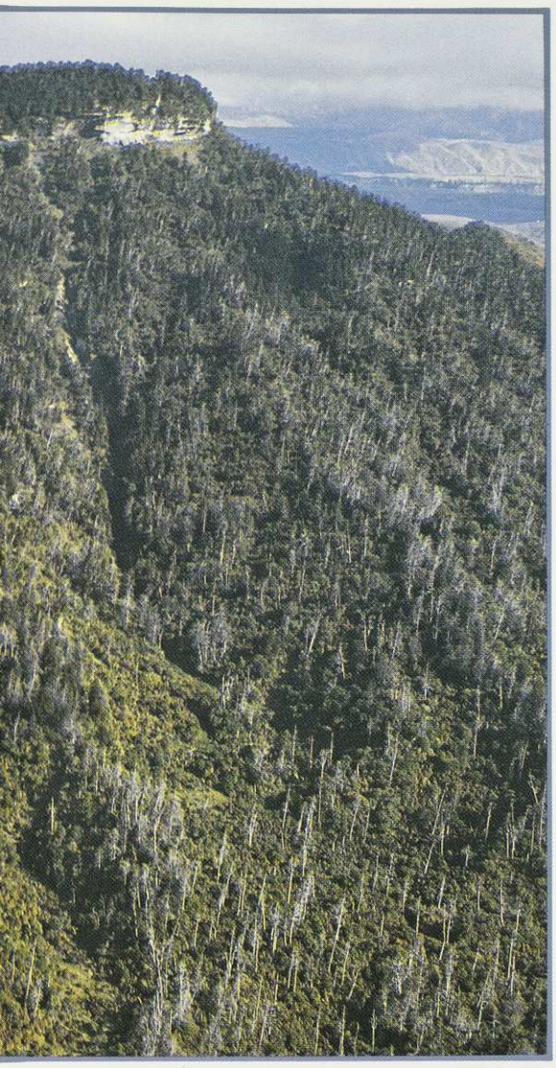
Inset: **The anti-browse divaricating strategy of the Central North Island endemic *Pittosporum turneri* is well illustrated by these plants near Te Rakaunuiakura.** *Photo: Geoff Rogers.*



Left: **New Zealand's 268 ecological districts. The Moawhango district, surrounded by Central North Island mountains, has strong landscape and plant affinities with parts of the South Island. Does the distribution of *Ourisia modesta* and *Euphrasia disperma* provide an insight to New Zealand geological history? Were areas which are today widely separated, once neighbours?**

Sanctuary preserve the region's natural values. This deficiency must be redressed. Some may say that the Southwest Kaimanawa foothills are protected by default as the Waiouru Military Reserve. Yet the public has no statutorily guaranteed input into planning or the custodial land use of this country by the Defence Department.

The P. N. A. programme uses numerous natural value categories in evaluating preservation priorities for a district. The strength of biogeography lies in highlighting habitats and landscapes which have incalculable biological importance. Habitats supporting outlying populations of species that may be far removed from the main population body can be targeted for protection. The habitats of endemic biota and local races or variants of species are clearly also worthy of protection. Such outliers are of equal conservation importance as the main population pattern. They exist as important ingredients, however rare, in producing the unique natural character of each



Aorangi mountain is of immense Maori cultural, scenic and scientific importance. The concept of Maori reservation, Nga Whenua Rahui, could protect natural and cultural values yet provide owners with income from the land. *Photo: Quentin Christie, Soil Bureau, DSIR.*

region. They have other scientific values – providing insights into the evolutionary history of biota and landscapes, and acting as a reservoir of genetic diversity.

Conservation Targets

The mainstream of conservation in the Moawhango focuses on Aorangi Mountain. This is a leftover pedestal of once more widespread marine sediment. Informed local residents such as Tony Batley (see *Forest and Bird* 1950s articles) watch over Aorangi with bated breath whenever logging proposals are put to the combined Maori ownership of the Aorangi block in the northwest Ruahines. The magnificent rimu-black beech forests on the south-west flanks are currently threatened by helicopter extraction and represent the most alarming threat so far (see *Forest and Bird*, November 1985, Conservation Update). Logistical and soil and water conservation problems have vetoed previous schemes, but such concerns evaporate with heavy lift helicopters. Logging would be a lamentable step since these high density podocarp-beech stands are now very restricted on western slopes of the Ruahines.

Beyond the forest the biogeographic hotspots at Makirikiri Tarns and Reporoa Bog need urgent conservation attention. To protect landscapes values, small fences around local peat bogs are tragically inadequate.

The 4751 ha. Aorangi block represents the best opportunity to protect a suite of representative Moawhango landscapes. One solution may lie in a Nga Whenua Rahui proposal to incorporate the block on a long term lease arrangement within the adjacent Ruahine State Forest Park. The block offers a significant revenue to the Maori owners from deer capture. Any negotiations must recognise the diverse cultural values. An ethic of sustainability for both value systems needs to be incorporated in any proposal — a possible early challenge to the Department of Conservation.

Geoff Rogers is an ecologist at Victoria University completing a PhD on landscape history in the Moawhango whose work is financially supported by a Hellaby Indigenous Grasslands Trust Fellowship. He is keen to see the PNA programme extended to other sensitive North Island districts.

OPERATION BIRD COUNT

Forest and Bird Society members are not confined in their areas of interest and study. Here, CHRIS SALE, a member of the Far North branch, writes of an expedition mounted and led by another Far North member, CAPTAIN GERRY CLARK, who has taken his expedition yacht Totorore *around the stormy but bird-rich southern oceans.*

The *Totorore* expedition left New Zealand in February, 1983, with the aim of studying the seabird life along the Antarctic convergence at sea and on all the islands and coasts along that region. It spent approximately two years exploring the bird life on the coast of Chile, also making a voyage down to the Antarctic continent and spending two winters around the coast of South Georgia. During the first voyage to South Georgia, a visit was also made to the Falkland Islands – *Totorore* losing its mast on this trip – and after the second voyage there it continued to the South Sandwich Islands and to Bouvetoya before heading to Cape Town, for repairs.

Bound for New Zealand, though, a mast was lost on the next leg, halfway between Cape Town and Marion Island, and the yacht had to cover 750 miles to Marion Island under jury rig. (The jury rig consisted of a spinnaker pole for a mast and a tarpaulin and bed sheets for sails!) At Marion Island some repairs were made, enabling Gerry Clark to continue solo to Crozet and Kerguelen Islands in the southern Indian Ocean. From there he sent a message that he was sailing on to New Zealand via Macquarie Island but storms rolled *Totorore* several times more, breaking its jury rig, and late in June the yacht limped into Freemantle, Western Australia. Repaired again, *Totorore* resumed its voyage, aiming now for New Zealand.

Deep concern for birds

Gerry Clark is a 59-year-old master mariner who through a lifelong study of birds, along with a feeling for the wide oceans, developed a deep concern for the future of the birds of the southern seas. This led him to build a small and sturdy boat in which others similarly dedicated might join him in studies aimed at safeguarding the birds and their lonely nesting places against the threat of commercialisation of the Antarctic continent.

On the family organic orchard at Kerikeri he built the 11m expedition yacht *Totorore* (Maori name for Antarctic prion) largely at his own expense over a period of seven years and early in 1983 he sailed via Chatham Islands for Juan Fernandez Islands and southern Chile. In more than three years spent mainly visiting remote islands off Chile and in the southern oceans the expedition has collected a vast amount of detailed information about the distribution and breeding grounds of many sea birds.

The expedition committee is grateful for the assistance and support it has received, especially from the Far North branch of the Royal Forest and Bird Protection Society, and many others.

Rich fields of study

The rocky wind and wave-swept islands of the Cape Horn area stretching eastward past the Falkland Islands to South Georgia and the South Sandwich Islands have over the past year been rich fields of study for *Totorore* and her crew. Those aboard with Gerry Clark have included such top ornithologists as Dr Alan Cowan, who has a Polar Medal for work on seabirds and Peter Harrison, British bird artist and photographer and author of the authoritative *Seabirds, an Identification Manual.*

Both had left the expedition just before I joined it in February 1985 at Punta Arenas, in the Straits of Magellan and had left glowing accounts of their periods of voyaging and study aboard *Totorore* around the far south of Chile, Harrison commenting that Gerry had contributed a lot to the knowledge of the birds, the sea birds especially, of the "fantastic" Cape Horn area; and Cowan recorded a "most memorable experience in an extraordinary part of the world – harsh and desolate and quite frightening at times when the weather is fierce and one really feels the force of nature."

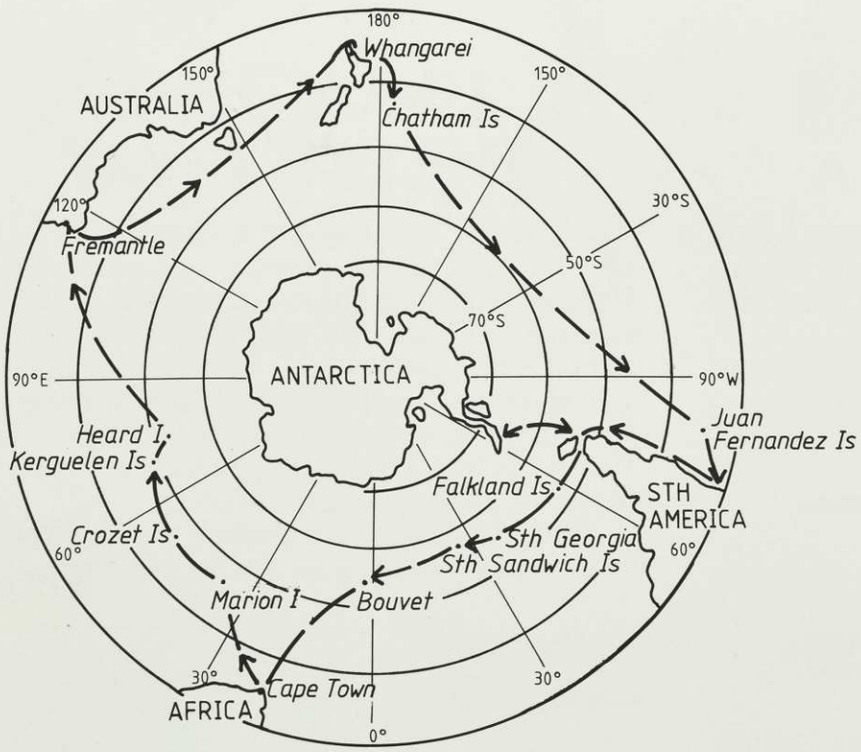
I arrived too late in the season to see much that was significant in the Cape Horn area, but *Totorore* was soon off past the magnificent canals of Southern Chile and then down across Drake Passage to the Antarctic peninsula, with a New Zealander working in Chile, Joi Rosoman making up our crew of three. It was a very late time of the year to make such a trip because of the advancing pack ice. Most of the breeding bird life had left but because this was an unusual time to visit the area the information gathered could prove interesting. And it was definitely a stunning place with nature at its grandest.

Major undertaking

The next stage was to follow up the expedition made to South Georgia by *Totorore* the previous winter, on work for the British Antarctic Survey. On the results of this, Dr J. P. Croxall, head of the Birds and Mammals section of the British Antarctic Survey, based in Cambridge, England, wrote to the expedition headquarters at Kerikeri:

"The project was to try to estimate the breeding populations of the two species, king penguins and wandering albatrosses, at all breeding sites known to us at South Georgia. This represents a major undertaking, the island being 182 km long, often of rugged topography and difficult of access, particularly under the weather conditions prevailing in the last winter.

"Nevertheless in their two-month fieldwork period the *Totorore* team carried out counts of wandering albatross chicks at every known breeding site and of king pen-



Top: **The *Totorore* expedition spent a month patiently counting the 34,000 king penguins in St Andrews Bay, South Georgia, just some of the invaluable data amassing carried out in the Southern Ocean.** *Photo: Gerry Clark*

Above: **Wandering albatrosses were also the subject of intense counting. Here, on frozen Anenkov Island (just off South Georgia), an albatross chick seeks food from its parent.** *Photo: Chris Sale*

Left: **Elephant seals at St Andrews Bay, South Georgia.** *Photo: Chris Sale*

The *Totorore*, built by Forest and Bird member Gerry Clark of Kerikeri, sails by Giekie Glacier, South Georgia. *Photo: Chris Sale*

guin chicks at all but three sites. Not only does this represent the most comprehensive survey of either of these species yet undertaken at South Georgia but, because all colonies were visited within a short time-span in a single season, it provides an excellent baseline against which to assess future changes".

Our task, with myself and Chilean Julia von Meyer as Gerry's team, was primarily to count the three remaining colonies of king penguin chicks, uncounted the previous year because of their large size.

We had a fairly gentle passage from Chile, and many black-browed, grey-headed and wandering albatrosses as well as many cape pigeons, various prions, giant petrels, Wilsons storm petrels and other birds soared about us. We sailed down the northern coast of South Georgia in fairly cold and wild conditions to check in to the authorities at Grytviken, and then headed back up the coast to a small island just to the north of South Georgia — Bird Island. There we were greeted by three scientists at a small British Antarctic Survey (BAS) station.

Vast seabird population

Bird Island has a vast population of seabirds breeding on it and many fur seals, most of which were absent as our stay was during the winter, but there were many wandering albatross chicks still on their nests. They are huge, covered in thick white down with big soft brown eyes, and when you walk past they clap their beaks at you with a sharp, clacking noise of deterrence. There were also many giant petrels.

We immediately departed to start counting the large king penguin colonies. We counted the first colony one by one – the chicks only – in Ample Bay, in the Bay of Isles a quarter of the way down the island at the foot of glacier, a situation favoured by most of the colonies. To count them we moved them very gently off the area where they were and let them move back again through a narrow gap left between us. The adults are undescribably beautiful with bright yellow colouration about the head, and the chicks are covered in dark brown down. The adults have a trumpeting call, while the chicks sort of whistle.

Our group moved from there to Salisbury Plain, a vast flat area between two large gently sloping glaciers, a short distance along the coast from Ample Bay. This population was counted by estimating a group, then counting the group, then estimating on the basis of that the rest of the population.

Month-long count

However, the final group (the largest and numbering more than 34,000), we counted again one by one, having to separate them with fences to ensure that, over the month that it took, the same chicks were not counted twice. This was a tremendous task in logistics, getting fencing materials on the site, working in very adverse conditions at times to transfer the materials more than a mile across the snow. At times the snow thawed so we fell through into icy glacier-fed streams, filling our boots with water. When we inevitably ran out of fencing materials we cut big blocks of ice and built long walls.

The island of South Georgia is covered in snowy mountains and is divided up by many deeply crevassed glaciers. In the winter it is covered with snow right down to the water line.

During the period *Totorore* was there the great majority of seals were absent, but there were still reasonable numbers of young elephant seals and fur seals, as well as quite a few leopard seals and some passive Weddell seals.

After completing the counts of king penguin chicks, our party went to off-lying Anenkov Island on the wild and exposed west coast of South Georgia, to count the wandering albatross chicks there. We counted the populations of chicks, doing the same on Albatross Island in the Bay of Isles, completing the count of the two biggest populations of wandering albatrosses after Bird Island.

During our stay we were helped enormously by the BAS scientists. The weather was at times fine and at times very cold and windy, allowing us to experience everything the climate had to throw at us.

Ice-beset waters

We departed from South Georgia and headed for the South Sandwich Islands through ice-beset waters, seeing large numbers of Antarctic petrels and southern fulmars. The weather treated us well and we managed to land on two of the islands, Candlemas Island and Vindication. All of the islands of this chain are volcanic, mostly active, and are all covered in snow and ice, some carrying thick icecaps. Many icebergs grounded near the islands had large numbers of chinstrap penguins on them which seem to travel large distances, using icebergs as a home.

On the cliffs around the South Sandwich Islands, southern fulmars, cape pigeons and snow petrels nested there in abundance. On Candlemas we were pleased to find approximately 90 Adele penguins.

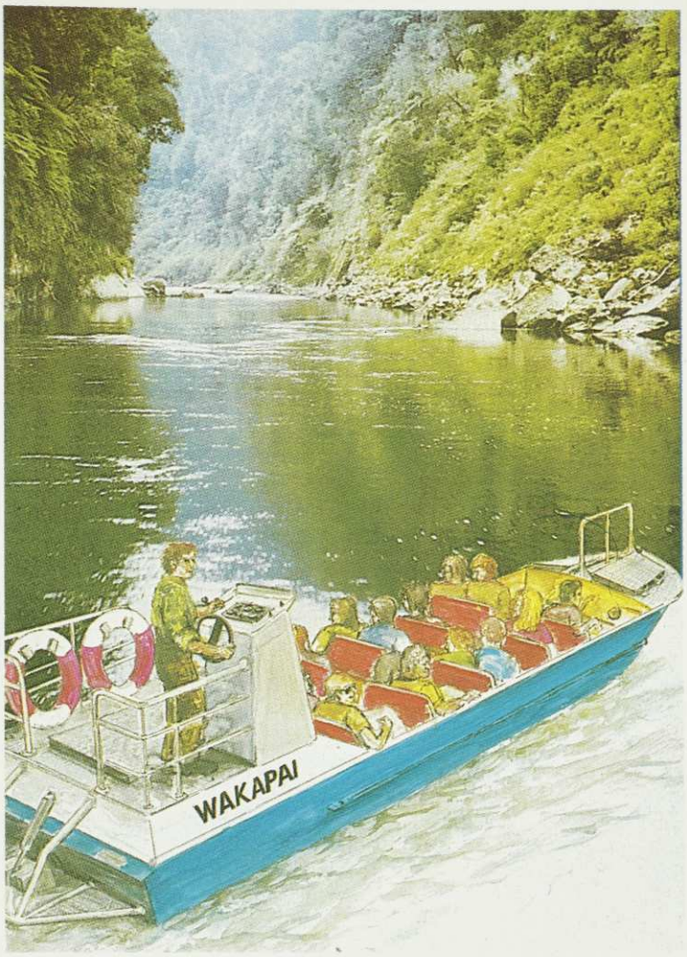
We headed south down the chain of islands until the pack ice was reached, when we turned and headed to Bouvetoya. On the way to Bouvetoya there were three days of heavy icing and all hopes of landing on that island were dashed when it was found that the waves were very severe there.

To collect data on the distribution of sea birds at sea, wherever possible every hour during daylight for a period of ten minutes we counted the number of birds and their species, as well as taking sea temperatures. So we still made good use of every day even when landings could not be made, although Gerry took advantage of every opportunity to get ashore.

Temperature rises

On the passage north to Cape Town the sea and air temperature rose on average by one degree C a day and we started seeing on average one new species of bird per day. We were now in a changed environment..

The work that the expedition has been doing is vital, although its role is very small. *Totorore* has been collecting data in areas seldom visited, rich in wildlife. The great southern continent could possibly be exploited in the not so distant future. Without the adequate data on which to base controls, the effect on wildlife in this region, out of the public eye, could be catastrophic. Not everybody, of course, has the good fortune of taking a trip such as this, but the ordinary citizen can influence the future of this hitherto unspoiled area in supporting groups like Greenpeace and the Antarctic and Southern Ocean Coalition, of which Forest and Bird is a member.



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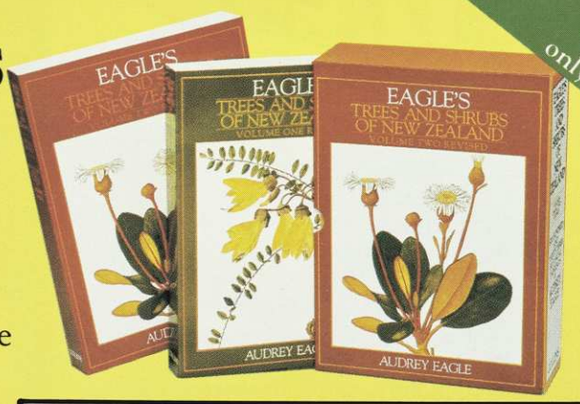

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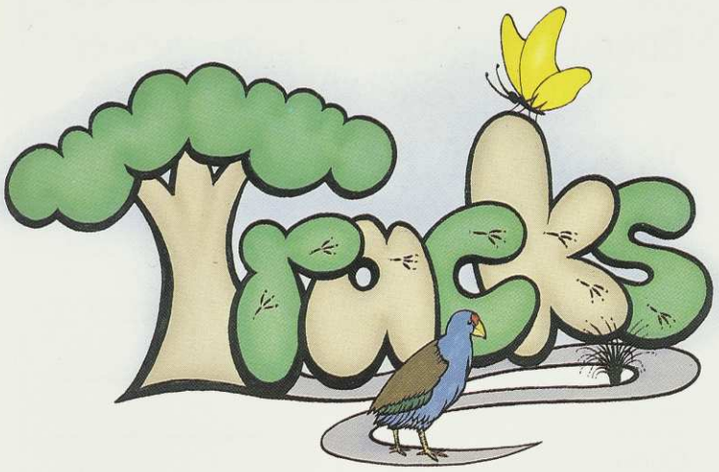


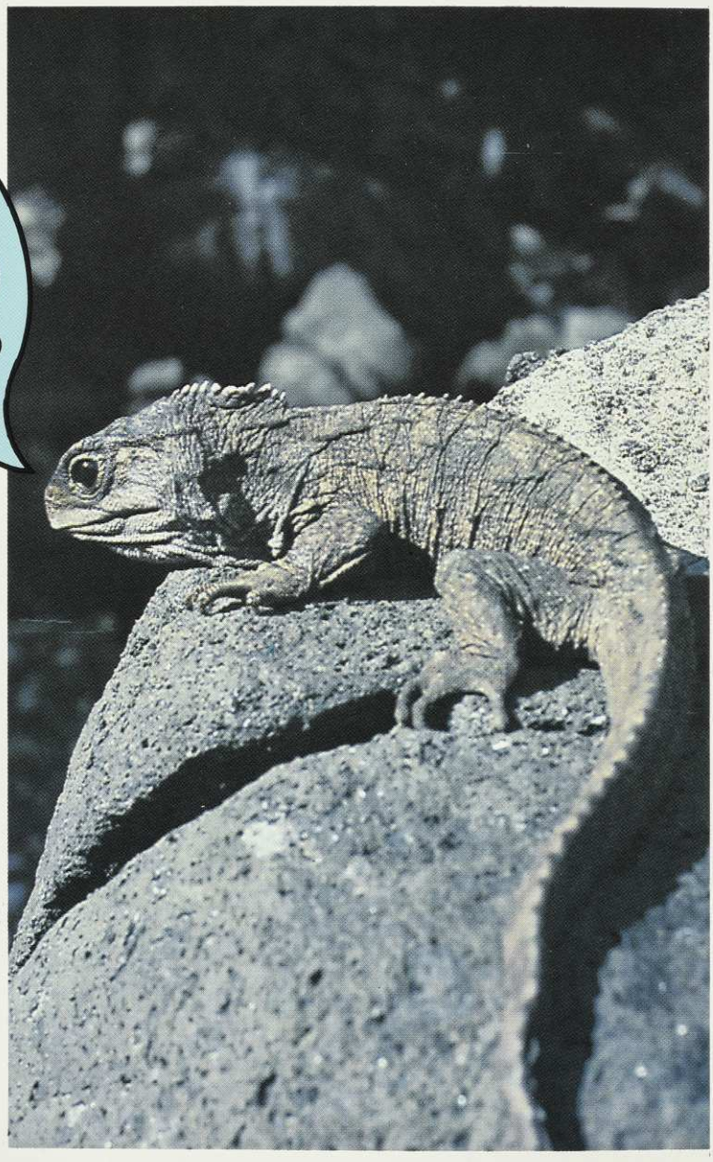
Welcome to the new section of the magazine for our younger readers. The new name was chosen as we hope *Tracks* will lead you into all sorts of interesting nature adventures. Future issues will include stories, pictures, puzzles, competitions and fascinating facts which will help you understand more about the natural world around us. We hope all you "Trackers" will get out and about and do things which will help protect and conserve all our native plants and animals.

As these are your pages, we welcome any contributions or suggestions on what could be in future issues of *Tracks*. Please write to *Tracks*, Box 7115, Whangarei with your ideas.

Editor,

Terry Fitzgerson

HOW WOULD YOU LIKE TO BE CALLED BEAKHEAD?



Sounds like a nick-name doesn't it? In fact it is the translation of Rhynchocephalia — the scientific name for reptiles with upper jaws overhanging their lower ones. Beak-head giants like the dinosaur roamed the earth over 200 million years ago. One of the smallest of the beak-heads, our native tuatara, is the only survivor of these ancient creatures.

Young tuatara have another sort of beak — a horn on the tip of their nose which they use for breaking out of their eggs. This egg-breaker falls off a few days after hatching. The eggs are laid underground and incubate for 12 to 15 months. Our spiny-backed tuatara often share the burrows of nesting sea-birds in the cliffs of islands around New Zealand.

Tuatara disappeared from the two main islands of New Zealand around the turn of the century. A major threat to their survival is the Norway rat which eats their eggs and we must keep rats off those islands where tuatara still survive. The tuatara's biggest enemies are other varieties of rat — the two legged types — those poachers and smugglers who steal tuatara to sell on the international black market for illegal private collections. This is despite a law which gives them absolute protection.

Like many lizards, the tuatara can shed its tail as a means of escape from enemies. The tail regrows but is usually shorter and is a different colour and pattern from the original.

A fully grown tuatara weighs about 1 kilogram and is about 60 centimetres long. They may live for up to 100 years.

Tuatara also have a fascinating "third eye" on the top of their heads. Unfortunately it is covered by thick scales early in its growth. Although this "eye" cannot see through the scales it has all the needed features for vision. Perhaps an even more fitting nickname for the tuatara should be "Old third eye"? But rather than dreaming up other nicknames for this unique creature, we should take every possible step to ensure tuatara survive for evermore.

What can you do to help?

- You can learn more about them and tell those around you how important it is to protect them.
- You could write to the Wildlife Service and ask them for further information on tuatara (Address: N.Z. Wildlife Service, Department of Internal Affairs, Private Bag, Wellington.).
- You could ask your teacher at school to allow you to do a project on tuatara.

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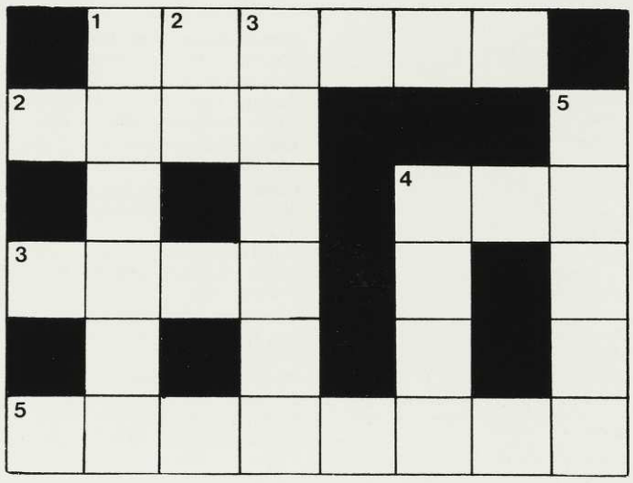


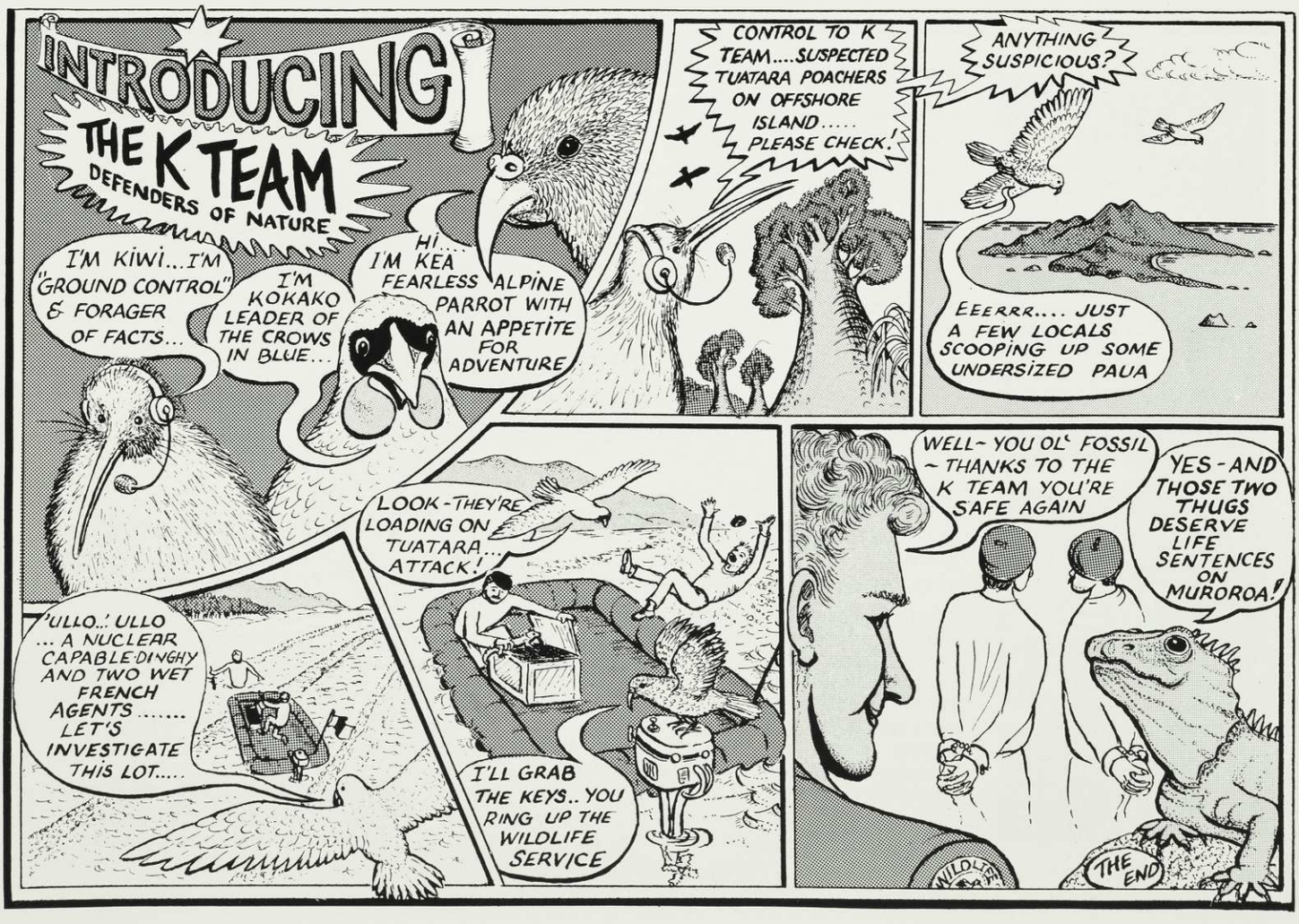
CROSSWORD CLUES

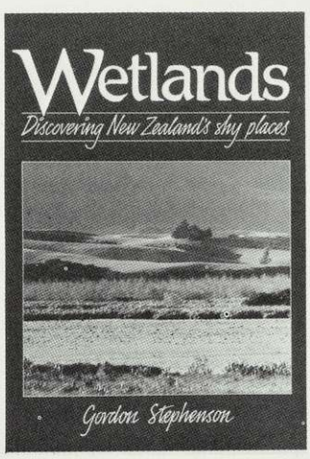
Across
1. Blue wattled crow
2. Forest parrot
3. Maori name for harrier
4. Alpine parrot
5. Parakeet

Down
1. Orange berried laurel tree
2. Alright
3. Large teatree
4. National emblem
5. King of the forest

The first correct entry wins the prizes and entries are restricted to Forest and Bird Society members under 15 years of age.

The lucky winner will be announced in the May issue of this journal.





Wetlands

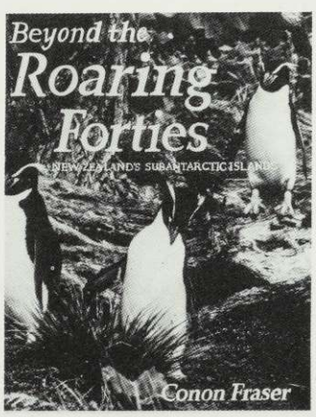
New Zealand's Shy Places

Gordon Stephenson

In recent years concern has mounted over the increasing loss of New Zealand's wetlands. They remain one of the least known and appreciated parts of our environment.

This book seeks to kindle an enthusiasm for wetlands, describing their rich bird, fish and plant life. The author takes the reader with him on visits to a number of accessible wetlands throughout New Zealand.

Colour & B/W pics
117 pages $16.95 inc. GST



Beyond the Roaring Forties

The Story of New Zealand's Sub-Antarctic Islands

By Conon Fraser (Foreword by Sir Peter Scott)

This fascinating book, on this unique subject, with superb photographs and illustrations is written in a clear and readable style. Situated in the Southern Ocean between New Zealand and Antarctica, these few groups of tiny islands are among the most remote and wild on earth. The Antipodes, Bounty, Snares, Campbell and Auckland Islands have some of the world's last few natural environments unmodified by man.

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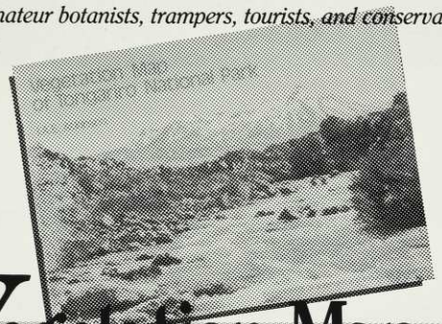

Vegetation Map of Tongariro National Park

North Island, New Zealand 1:50 000. The only vegetation map of the area available at this scale. In full-colour.

An accompanying 27-page booklet describes in detail the Park's plant communities and outlines factors influencing their distribution. Other aspects of the Park are also covered — climate, landforms, soils, ash deposits, and introduced flora and fauna.

Price NZ$4.50 NZ$6.00 including GST and p+p

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JS WATSON CONSERVATION AWARDS

The following awards have been made for 1986:

Ross Galbreath — $2000
Ross intends to write a historical study of the beginnings of fauna conservation in New Zealand, with special reference to the establishment of island reserves, particularly Little Barrier Island. At present he is engaged in writing a biography of Sir Walter Buller, pioneer New Zealand ornithologist.

Alison Davis — $1500
Alison's research on the N.Z. shore plover is directed to the conservation management of this species. This knowledge should enable shore plover to expand on other islands, and be less vulnerable to extinction.

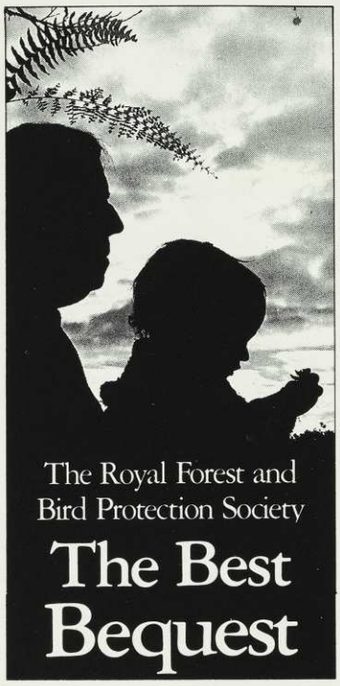
Colin Miskelly — $750
This money will help support Colin during the second field season of his thesis. He is studying the N.Z. snipe on The Snares and South East Island. Canterbury Branch of Forest & Bird have also helped him with their Stocker Scholarship last year.

David Allen — $750
David is studying the behavioural ecology and aspects of song of the Whitehead on Little Barrier Island, and his thesis will provide a greater understanding of the bird's biology.

Bushy Park Management Plan

The draft plan for the Society's forest reserve adjacent to the Bushy Park Lodge is now available for comment. If you wish to read or comment on the plan, please write to: The Secretary, RF & BPS, PO Box 631, Wellington, enclosing $15 to cover reproduction costs and postage.

Acknowledgements
The sandflounder illustration used in the article on page 15 of the August 1986 magazine was taken from the book *Between the Tides*, by Mike Bradstock (Reeds).



The best bequest

Give your children and grandchildren the best bequest of them all: the preservation of New Zealand's native plants and animals.

Bequests to the Society are one of the best methods of support it has had. Now, to make it easy to find out how to give a donation or gift in your will, the Society has prepared a clear and concise pamphlet. *Write to the Secretary, RF & BPS, PO Box 631, for your free copy.*

OBITUARY

Mrs H. L. BRIFFAULT (1903-86)

With the passing of Violet Ada Briffault (nee Rucroft) on 2nd May this year, the Society lost a Distinguished Life Member, longtime Councillor and one of its early stalwarts.

Mrs Briffault (Vi, Ru or Briff as she was affectionately known) had four great loves — natural history, music, history and the Christian faith. These interwoven threads provided the continuity of her life, and she was intensely active in all of them. A music teacher by profession, her love of nature began in the 1930's in the notorious fogs of London, where she was studying at the Royal Academy of Music. Longing for the clear air and fresh open spaces of home, she returned to New Zealand after the war, settling in Whakatane in 1950 and founding the Eastern Bay of Plenty Branch of the Society.

In Norman Potts (1886-1970), the pioneer East Coast lawyer/botanist, himself a distinguished member of the Society, she found a catalyst for her growing love of the New Zealand flora. There were frequent visits, letters and exchanges of plants. Her Society involvement centred on the education of youngsters, and a vigorous planting programme of native trees and shrubs throughout the district. Her own garden in Whakatane was a showplace, unusual for its conspicuence of common as opposed to rare plants.

Her contribution to conservation, in particular her untiring efforts to have the Urewera National Park gazetted in 1954, was recognised by the honours of Vice-President in 1969, the Loder Cup in 1971, and the Queen's Service Medal in 1977. A woman of remarkable character and uncompromising principle, Briff has had a lasting impact on those who knew her, and laid solid foundations for those who follow.

Mark Smale

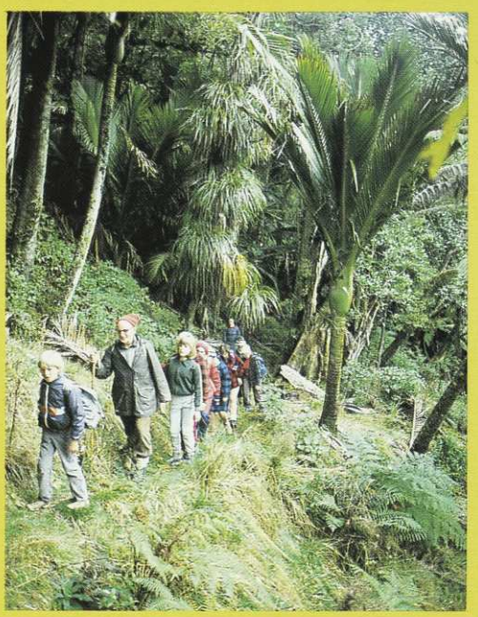
South Pacific Appeal

Returns from the appeal have been very encouraging, as have the positive comments from our thousands of contributors. Some examples: "Congratulations to Dr Alan Mark and his excellent letter – many members will be as inspired as we are by it." "I am glad to see your entry into a coverage of the Pacific, where I have noted a necessity even greater than here for immediate management and control of forestry."

By the beginning of October the appeal total stood at $30,000. Our Pacific Forest Conservation Coalition is now developing a strategy to use this money most effectively; by the February magazine we should be able to inform members on progress.

This appeal was a novel one for the Society in that it asked New Zealanders to look beyond their immediate neighbourhood; the good response highlights the close community of interest between this country and the South Pacific. To those thousands who did contribute, thank you. The Society is now in a position to try and stem the horrific destruction of some of the world's precious tropical rainforests.

The kea pictured could not be further from its South Island high country home. This advertisement was lifted from an American magazine *Watchbird*, and offers "2 sexed pairs currently available." The Wildlife Service says that all kea exports are illegal and has no idea where this bird could have come from. It's a sad day when we see our increasingly rare "high country monarch" being offered for sale. Meanwhile, we are still waiting for the announcement from Internal Affairs Minister Peter Tapsell that the kea has been given full protection — a promise he vowed to fulfill before the end of the year. We urge members to write to the Minister to remind him of his pledge.



Wairoa and Gisborne branches combined for a special Conservation Week field trip to the Mahia Scenic Reserve – a magnificent oasis of coastal broadleaf-nikau forest amidst the barren and eroding East Coast hill country farmland. Here Gisborne branch chairman Alan Webster introduces younger members to the plants and animals on the reserve. *Photo: G McSweeney*

Protected Natural Areas Programme

Only one new survey for the Protected Natural Areas Programme will be carried out in the 1986-87 financial year due to Government funding cuts. One of the essential ingredients for environmental protection in New Zealand, the programme aims to establish a series of protected areas to preserve the country's ecological diversity. It covers both public and private land.

Meanwhile, however, reports on past surveys are slowly trickling out. Members interested in knowing what is special about their region can write to the Department of Lands and Survey, Private Bag, Wellington, for a copy of the Egmont (ring plain area) ecological region report ($8), and Otago's Old Man ecological district report ($13).

Spotted grouper protected

The wondrous Kermadec Islands spotted grouper, featured in the August edition of *Forest and Bird*, has been given full protection by Government from commercial fishing. The grouper, which grows as long as 1.2 metres, is very vulnerable to fishing pressure. It changes sex from female to male about halfway through its lifespan, measured at between 30 and 50 years.

Spotted grouper protection was one of three proposals aimed at protecting the marine life of the Kermadecs; the other two, yet to be decided on, are to ban commercial fishing (except for tuna) within 12 miles of the Kermadecs, and to prohibit fishing for hapuku and bass within the 200-mile zone around the Kermadecs except by special permit.

Conserving our future

The theme of Conservation Week this year was very much in the minds of hundreds of schoolchildren in the Wairoa region, 24 schools contributing displays and posters to a magnificent nature exhibition organised by Forest and Bird Wairoa branch.

The hundreds of displays, together with others from Forest and Bird, the Wildlife Service, World Wildlife Fund and the Forest Service, were visited by all the schools in the region over three days. A lecture programme focused on Conserving for the Future — including discussion on threatened species, conserving marine resources, erosion prevention and afforestation.

Exhibition organiser Doug Heighway was overwhelmed by the enthusiasm for the event. "We were amazed at how many schools contributed to the display and by their very high standard. The concern shown for our coastlines, soil and native plants and animals is good news for the future," he said. It's obvious that conservation awareness is very high in rural New Zealand.

The winning display in the Wairoa Conservation Week nature exhibition. Te Mahia School, from the Mahia Peninsula, focused on the vital importance of conserving our marine resources. *Photo: G McSweeney*

Conservation News

Are you an active conservationist? Do you want to hear about the latest developments in conservation, who's making the decisions and why? For the latest in up-to-date information, subscribe to *Conservation News*, the Society's monthly newsletter. Cost: $6.60. *Conservation News* — the story behind the scenery.

Photographers!

Have you got the high quality professional photograph/s we want for our 1988 New Zealand Nature Heritage Calendar? We would like to see them. The theme of the calendar is on threatened and distinctive species and their habitats from throughout New Zealand. We are looking for variety — in other words snails, native frogs, lizards, wetas, birds, plants, landscapes.

If you think you have an outstanding colour slide, please send them to Forest and Bird Calendar, PO Box 631, Wellington. All care will be taken. A small payment will be made for photos used and these and any not used will be promptly returned by registered mail.

Conservation Staff

Subject and Author Index

Books Received

A Field Guide to the Native Trees of New Zealand, *by J.T. Salmon ($32.95, Reeds).* Anyone who has attempted to carry Professor Salmon's large ***The Native Trees of New Zealand*** into the bush will appreciate the convenience of this field guide. The best feature of the original — easy identification of our native trees — remains, and to save space all species from outlying islands have been eliminated, along with tree ferns. The text has also been shortened.

The Offshore Islands of Northern New Zealand, *edited by A.E. Wright and R.E. Beaver ($16.50, Lands and Survey Dept).* Three years ago the Offshore Islands Research Group convened a symposium in Auckland. This 255-page book contains all the papers presented and is essential reading for anyone interested in the plants, animals, fish and their interaction on islands mainly from Coromandel northwards. It is immensely readable and hence ideal for the amateur naturalist interested in conservation of our unique island biota. Available by writing to Information Services, Lands and Survey Dept, Private Bag, Wellington.

Wetlands: Discovering New Zealand's Shy Places, *by Gordon Stephenson ($16.95, Government Print).* This easily readable booklet is a compelling contribution to the cause of wetland protection. The author takes the reader on a chatty ramble to a few of our more accessible wetlands, describing their formation and why each is a place of special interest and importance. The booklet discusses various types of wetlands and focuses on examples of each. You may not find your favourite wetland mentioned here but you should gain a greater appreciation for why we should protect what remains.

Jonathan White's New Zealand *($99.95, Moa Publications).* For those lovers of traditional landscape painting, artist Jonathan White's latest offering will be a welcome addition to their collection. The selection of 41 scenes is New Zealand-wide, with some emphasis on areas important to conservation such as Puketi Forest, the Catlins coast, Stewart Island and Takahe Valley. Text is by well known Southlander, John Hall-Jones.

THIS BIRD NEEDS PROTECTION

Photo by courtesy of Wildlife Service

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Bushy Park Lodge
Kai Iwi, 24km north of Wanganui on sealed road.

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Accommodation: for 15 in six bedrooms, single and double beds, electric blankets, heater and vanity units. Sleeps 24 with mattresses. Bedding, linen and towels supplied. Showers, drying cupboard, kitchen with electric stoves, refrigerator, deep freeze, cutlery and crockery. Bring own rations. Milk may be ordered.

Fees: (House Guests) Members $20 single, $25 double, Non-members $25 single, $30 double. Children 6-12 $8. (Day Visitors) All adults $2, children 5-15 $1, Family $3 or $5. Closed to day visitors but not House Guests Mon & Tues except holiday periods.

Bookings and Information Leaflet: Custodian, Bushy Park Lodge, Kai Iwi, RD8 Wanganui. Telephone Kai Iwi 879. STD (064) 29-879.

Okarito Beach NFAC Cottage
Sleeps 4-6 in basic but comfortable facilities, water, wood stove, 2 • rooms. Sited in historic township, coastal and bush walks, Okarito lagoon, Westland National Park and glaciers. $3 per person per night. Bookings: Bill Minehan, Private Bag, Hokitika, Ph 734 Whataroa.

William Hartree Memorial Lodge, Hawke's Bay
The lodge is situated 48km from Napier on the Puketitiri Road and 8km past Patoka, amid the 14ha William Hartree Memorial Scenic Reserve.

The Lodge accommodates 10 people. Extra mattresses and pillows are available to sleep up to 20. The lodge has a full equipped kitchen, including refrigerator.

Visitors supply their own linen and cutlery. The nearest store is 8km away. No animals are permitted.

For rates send a stamped addressed envelope to the Booking Officer, June Norther, 212 Kennedy Road, Napier, Telephone Napier 438 193.

Ruapehu Lodge, Whakapapa Village, Tongariro National Park
Ruapehu Lodge is now available for MEMBERS ONLY, and all bookings must be made with the Society's head office, P.O. Box 631, Wellington.

Fees: Winter Season (1 June to 31 October and Christmas and Easter holidays $11.00 per night. Summer Season 1 November to 31 May) Adults $7.70 per night Children $4.40 per night. (GST inclusive)

Full payment must be paid four weeks before occupation, (otherwise bookings may be forfeited) after which time there is no refund for cancellation.

No animals or pets are allowed in the lodge or the National Park.

There is no key at the lodge, but one will be posted ten days before occupancy. No member may occupy the lodge without first booking through Head Office, Wellington.

Tautuku Lodge
Tautuku State Highway 92, South East Otago. Situated on the Royal Forest and Bird Protection Society's 550 ha Lenz Reserve 32 km south of Owaka. In a bush setting, and many lovely beaches nearby providing a wonderful base for exploring the Catlins. 3 well appointed buildings, the Lodge, the Coutts cabin and an A-frame sleep 10, 5 and 2 respectively.

Information and rates on application to the caretaker: Miss M. Roy, Papatowai, Owaka, R.D.2. Phone (0299) 58-024. Stamped addressed envelope with inquiries please.

Turner Cottage, Stewart Island
Turner Cottage, is on Stewart Island and is a two-roomed dwelling furnished for three people.

For details write, enclosing a stamped, addressed envelope, to: "Turner Cottage", C/o Mrs N. Fife, P.O. Box 67, Halfmoon Bay, Stewart Island.

Tai Haruru Lodge, Piha, West Auckland
A seaside home situated in Garden Road, Piha, 38km from central Auckland. Eight minutes' walk from the Piha store, with right-of-way access to the surfbeach and close to bush reserves and walking tracks in the Waitakere Ranges.

The lodge is fully equipped and sleeps six to eight persons. It has a large lounge with open fire, dining area, and modern kitchen.

You will need food supplies, bed line, towels, and tea-towels.

Different rates apply for winter and summer, for rates send a stamped, addressed envelope to the Booking Officer, Mrs B. Marshall, 160 Valley Road, Henderson, Auckland. Telephone 836-5859.

Waiheke Island Cottage, Onetangi, Waiheke Island
The cottage has comfortable bunk accommodation for eight people and has a stove, refrigerator, and hot water. Adjacent to a 49ha wildlife reserve, belonging to the Society it is in easy walking distance from shops and beach. It is reached by ferry from Auckland City (two or three returns daily) and by bus or taxi from the island ferry wharf. Everything is supplied except linen and food. No animals are permitted.

Different rates apply for winter and summer. For rates send an addressed envelope to the Booking Officer, Mrs R. Foley, 23 Stoddard Street, Mt Roskill, Auckland. Telephone Auckland 696-769 (evenings).

What strange geological processes have selectively preserved habitats for a host of plants in the Moawhango district of the central North Island? This area is the only North Island home of these plants, which are also found in the South Island. The breathtaking sweep of Moawhango landscapes, seldom appreciated by North Islanders, are reminiscent of Central Otago landscapes, with undulating marine sediment plateaux supporting red tussock land studded with pockets of kaikawaka forest that survived Polynesian burning. Mt Ruapehu is to the left, Mt Ngauruhoe to the right. An article on this fascinating area is on page 24 of this issue.

Photo: Quentin Christie, Soil Bureau DSIR

Inset: This damp habitat *Carex berggrenii* occurs locally in the South Island and in the distant upper reaches of the Moawhango plateaux. *Photo: Geoff Rogers.*

Described in the 19th century as "one of the most wonderful, perhaps, of all living birds," the kakapo is today clinging to survival by the narrowest of margins. Articles on the kakapo and other endangered birds are featured in this issue.
Photo: Rod Morris